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The States' Roles in Solid Waste Management

A Task Force Report

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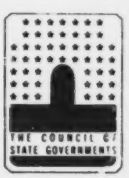

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THE STATES' ROLES IN SOLID WASTE MANAGEMENT

A TASK FORCE REPORT

COUNCIL OF STATE GOVERNMENTS

MAY 1973

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April 5, 1973

Mr. William D. Ruckelshaus
Administrator
Environmental Protection Agency
401 M Street, SW
Washington, D.C. 20460

Dear Mr. Ruckelshaus:

The report herewith submitted contains new perspectives on governmental problems related to solid waste management practices in the United States. The report contains findings of an independent Task Force created by the Council of State Governments and supported by the Office of Solid Waste Management Programs, Environmental Protection Agency. This evaluation by the Task Force represents a continuing effort by the Council to examine the States' roles in a single functional area.

The Task Force has described the difficulties involved in solid waste management in terms which permit better evaluation by political institutions. Some of the solutions offered by the Task Force extend beyond more familiar solid waste management functions. However, many of the Task Force's views are similar to those previously expressed by other organizations concerned with current problems of intergovernmental responsiveness. More specifically, the Task Force has described intergovernmental needs in terms that provide innovative solutions in this area of concern.

We believe the resulting consensus on the part of the Task Force in this comprehensive report provides an invaluable contribution to an understanding of the complexities of solid waste management and the role of state governments in this field. We hope that the report is a start toward other substantive efforts in this important problem area.

Sincerely,

Brevard Crihfield
Executive Director

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Preface

This report by the Task Force is the result of an effort to develop a basic assessment of the roles of the States, their local governments, and the federal government in relation to current solid waste management problems. From the outset, it was clear that the implications of solid waste management problems would require broad-ranging considerations. The following roles of the States were to be assessed by the Task Force:

1. The management capacities of the States in a national system of solid waste management, including enabling legislation, administrative organization, intergovernmental coordination, regulation, and policy objectives;

2. The financing of state solid waste regulatory and technical assistance programs, including alternative state government mechanisms and intergovernmental approaches; and

3. The alternative delivery systems for institutional development and administration, including planning, operation, maintenance, and accountability.

The Task Force recognized that the impetus of our growing national concern for solid waste management problems emerged from congressional efforts during the 1960s. We are still in the problem identification stage with respect to state and local government solid waste management needs. This report attempts to more clearly identify the major problems facing state and local governments in their efforts to develop improved solid waste collection and disposal services for residents of their respective jurisdictions.

As these problems were discussed by the Task Force, their significance and complexities gradually emerged. This report has been structured to permit the reader to recognize the scope of the problems that emerged before the study group.

This Task Force began its efforts beyond the nonnal technological considerations that have been the typical discussion points of solid waste management groups. Our objective was to consider policy-level problems concerning solid waste management requirements being faced by state governments throughout the Nation. These efforts have been successful, but our resulting considerations recognize solid waste management needs as one of many community services that must be improved while, at the same time, the quality of our environment is retained. This perspective helped establish the interrelationship between political and economic concerns as they relate to our technological capabilities. In considering the implications of solid waste management problems within our political institutions, the original purpose of this effort by the Task Force, it has become clear that solutions to these problems will have to recognize much broader implications. As a result, the conclusions and recommendations of the Task Force are partially directed towards long-range solutions as well as more immediate courses of action that can be taken by state government.

The breadth of information developed in the brief three-month period during which this Task Force functioned has exposed many problems not formerly associated with solid waste management concerns. These findings should provide substantive discussion material for consideration by the Council, its affiliated organizations, and other organizations and agencies of government concerned with solid waste management problems. From such deliberations, new directions for improving local, state and federal governmental relations in this area of concern should emerge.

The Task Force was drawn from around the Nation, and while it was comprised of only nine members, their interest and dedication is reflected in the penetrating scope of this report. Members of the Task Force included: Donald R. Andres, Senior Sanitary Engineer, California Bureau of Vector Control and Solid Waste Management; June Brown, National Representative, League of Women Voters, Toledo, Ohio; Harold Gershowitz, President, Waste Management, Inc., Oak Brook, Illinois; Tom Jensen, State Representative, Knoxville, Tennessee; Gordon N. Johnston, Mayor, Tacoma, Washington; Charles P. McIntosh, Budget Secretary to the Governor of Pennsylvania; Robert H. Quinn, Attorney General, Massachusetts; and James Record, Chairman, Board of County Commissioners, Madison County, Alabama. The Task Force wishes to express sympathy to Mr. McIntosh for his illness and inability to participate fully in this project.

The efforts of Charles Vigh of Jacksonville, Florida, are to be commended. The Task Force extends special note of appreciation to the firm of Reynolds, Smith and Hills, Architects-Engineers-Planners, for assisting in this project by allowing Mr. Vigh to participate on a manpower loan basis.

The Task Force wishes to acknowledge the numerous governmental agencies, private organizations, and individuals who responded to the requests for information or who participated in discussion sessions. A special note of thanks for his continuing interest and support is due Mr. Samuel Hale, Jr., Deputy Assistant Administrator for Solid Waste

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Management Programs. The constant and continuing interest of Mr. Thomas Whalen, Project Officer, Office of Solid Waste Management Programs, Environmental Protection Agency, is generally acknowledged. He recognized the need of diverse group searching for fresh solutions to consider factors beyond those written in a grant proposal's scope of service even when the answers reached stretched the federal government's concept of project accountability. The Task Force wishes to thank the Council of State Governments and the Environmental Protection Agency for encouraging the development of a fresh view of state-level solid waste management problems. Finally, the National Association of County Officials and the National League of Cities must be recognized for their cooperation in the efforts of the Task Force.

Thomas Anderson, *Chairman*
State Representative
Southgate, Michigan

March 1973

Summary

Evaluations of the problems outlined in this report illustrate the extent of the national concern associated with the need to improve solid waste management practices in the United States. The findings of the Task Force should be recognized as descriptions of basic needs that must be considered to develop workable solutions in each State. The priorities and detailed options to be considered for accomplishing these ends could not be developed. These will vary in each State according to the character of local problems and public concern for their solutions. Therefore, this report will be most useful as a guideline document for identifying the fundamental problem areas affecting the delivery of solid waste services by local governments.

The findings in this report indicate the need to reevaluate current state solid waste management policies. As one of the members of the Task Force noted, the group was called together because the system is not working very well. Local governments are unable to cope with the magnitude of problems facing them, and state governments seem to lack the capability of providing necessary assistance. At the same time, solid waste management is emerging as one of the most vexing problems facing local governments during this decade.

LOCAL GOVERNMENT PROBLEMS

The more than 20,000 municipal corporations and over 3,000 counties represent, in most States, the local governments which are normally obligated to provide solid waste collection and disposal services for inhabitants of their jurisdictions. The level and quality of services presently provided and the inability to improve these services primarily rest with the administrative and fiscal capabilities of these governments.

Various studies have shown that adequate collection or disposal services can be directly provided by government at reasonable cost when the local solid waste service area includes a population approximating 30,000 inhabitants. We must recognize that in 1970 roughly 90 percent of all municipal corporations and about 60 percent of all counties had populations of fewer than 25,000 inhabitants. *Most* municipal corporations in the United States, about 66 percent, had populations of fewer than 2,500 inhabitants in 1970.

Most local governments serve very small populations, have lay administrations, and have limited professional assistance to develop and operate effective solid waste service systems. Their limited fiscal capabilities for supporting existing or improved levels of services are only symptomatic of more fundamental problems.

Very few local governments have the administrative and managerial capabilities for providing effective solid waste services through aid programs limited to financial assistance. *Most* local governments do not have either the managerial ability or the fiscal ability to sustain improved services, once provided, without continued assistance.

Solid waste management problems represent only one of a number of interrelated local government problems, and fundamental solutions can be expected to occur in response to broad-scale efforts to improve local government capabilities. Solid waste services represent only one of a number of necessary urban services that local governments must improve. In addition, improved solid waste services also require consideration of numerous natural and cultural environmental concerns.

Because *most* local governments are presently incapable of providing for or sustaining substantially improved solid waste collection and disposal services, strong state-level actions will be necessary to assist these governments to improve their capabilities. Effective state actions oriented towards the modernization of local governments and the stimulation of general public responsiveness to such efforts are generally not provided; they are needed. While much technical information for improving these necessary services also will be required, workable solutions will necessitate fundamental, long-range efforts with joint participation between the federal government and the States.

STATE GOVERNMENT FUNCTIONS

State governments have the obligation of assuring that local governments provide for efficient, environmentally sound solid waste services for their inhabitants. The States cannot be satisfied with only a regulatory role; they must provide various forms of aid (administrative, managerial, financial, and technical) necessary to assist and encourage local governments to expand and improve services.

To meet this challenge, state governments will have to accelerate their administrative reevaluation processes and the capabilities of State Legislatures to evaluate state and local government needs will have to be strengthened. These efforts would include: legislative standing committees focusing on these problems; administrative programs to bring about improved interagency coordination; and improved investigative and analysis service capabilities for both Legislatures and administrations.

State governments must take a positive role in assisting local governments to solve their solid waste management

problems. This will require new administrative and legislative actions directed towards:

1. Establishing a state commitment with a strong state policy to develop the means to provide solid waste services in an environmentally safe manner;

2. Broader forms of assistance to local governments oriented towards improvements in administrative structures and management capabilities;

3. Strengthened, but regionally flexible, regulatory functions to reflect differing problems and needs in local areas;

4. More direct involvement in the location of facilities and sites essential for the provision of this necessary service;

5. Consideration of direct state actions to provide for necessary services in areas where local governments cannot be modernized.

Over the years, many limitations have been placed upon local governments by the States. The need for some of these restrictions may no longer exist and now serve to retard local governments' abilities to provide improved levels of essential services. The reevaluation of state restrictions upon local governments will require substantive investigations by State Legislatures. Legislatures also must undertake more comprehensive evaluations of mechanisms needed to stimulate the modernization of local governments.

A FEDERAL GOVERNMENT ROLE

Improvement in elementary levels of solid waste collection and disposal services will require *expansion* of and *substantial redirection* of federal programs to assist the States and their local governments if current trends are to be altered. A federal program view oriented towards solid waste management as an isolated activity is untenable. Solid waste services are integrally related to a wide range of general urban services improvement problems being faced by local governments. These problems are serious and can be expected to become more severe, especially in urban America, during the foreseeable future.

It will be necessary for the federal government to develop a partnership arrangement with state governments for the development of the necessary managerial mechanisms required to bring about these solutions. This partnership requires much more than the delivery of funds from the federal government to the States or to local governments. It will require a joint effort in developing the machinery of government which recognizes the important roles of both the federal government and the States. This will require a coordinated federal-state research effort to learn the extent of the problems occurring within each State from which the procedures and priorities for developing solutions can be evolved. This research will have to include both pure and applied research oriented towards: the identification of problems; the technology needed for solving problems; and the political, economic, and social adjustments needed to evolve acceptable solutions to identified problems.

Federal programs oriented towards the improvement of specific local government needs or the regulation of specific activities also need to be coordinated with parallel agency functions. Moreover, greater efforts will be necessary to assist state governments in the development of their management structures for evolving long-range solutions to fundamental problem areas.

The States cannot accomplish major changes in existing solid waste management practices without substantive federal assistance. The assistance needed includes:

1. A strong, national policy directed towards a commitment to assist the States to develop the means to provide adequate solid waste services in an environmentally safe manner;

2. Expanded pure and applied research to be engaged in jointly by the federal government and the States directed towards the solutions of existing problems that are retarding the provision of improved services. The joint research effort must include environmental, economic, and other forms of research needed to develop solutions within the context of our institutional framework;

3. The establishment of minimum federal performance standards or quality standards for the safe disposal of solid waste in a manner that can give direction to the States in their program development efforts;

4. A federal regulatory role limited to the common national problems associated with the handling and disposal of very hazardous wastes;

5. A national commitment to develop the manpower capabilities needed at all levels of government to administer, manage, and perform necessary services or activities related to these services. To date, little or no management skill training is required for administrators and managers in the federal, state, and local governments related to administrative requirements needed for solid waste management functions.

Many of the Task Force's recommendations are directed towards immediate actions that should be considered by the States and the federal government. The redirection of national policy expressed in the section of this report entitled "A National Research and Technology Development Program Concept," page 39, is oriented towards an evolutionary national policy with long-range implications. Among these long-range considerations is the need for a national redirection of policies to expand the reuse of materials currently considered solid waste. Final solutions to our Nation's solid waste management problems will be found only through the maximum recovery of energy and secondary materials now discarded as solid waste.

Part I
Problem Areas

Introduction

The following nine chapters of this report outline the major solid waste management problem areas discussed by the Task Force. The Task Force evaluated numerous alternatives (options) for arriving at workable solutions to these problems, and their recommendations (see Part II) represent the group's consensus views. The recommendations, or selected options, of the Task Force represent the general view of this national group and their assessment of workable solutions to these problem areas.

Each State can expect to have problem areas similar to those described in this report, but the seriousness or extent of their problems will vary according to regional differences within a State. Therefore, problem priorities and the methods that must be considered to bring about solutions to these problems also must be oriented towards the regional needs of each State. This summary of general problem areas serves to permit a rapid identification of the range of problems to be expected in relation to state-level concerns related to solid waste management. For each problem area a number of alternative courses of action are possible for arriving at workable solutions within each State. The number of possible options that might be considered will vary in each State according to state constitutions, state laws, administrative agency structures, and the attitudes of the people in each State. As the applicability and intensity of the comparable problem areas being faced by a state government are considered, alternative courses of action for solving these problems according to some accepted priority schedule can be more readily identified.

1. Federal Directions

This chapter briefly summarizes the major directions of the federal solid waste management effort. It has been included here to provide a perspective of the Task Force's recognition of the contribution of the federal government in exposing our national solid waste management problems.

LEGISLATION

The 1965 federal legislation on solid waste management was enacted out of recognition of rapidly expanding volumes of solid waste being generated in urban areas throughout the country. It was recognized that this waste was becoming increasingly difficult to dispose of, and the legislation was aimed at the development of technology to collect, handle, and dispose of solid waste, and it was to include technical assistance programs for States and local governments. In 1970 this legislation was amended, in essence, to give greater emphasis to the need to develop greater capabilities for the recovery of materials from the national solid waste stream.[1]

The original legislation also emphasized the development of solid waste management planning programs within the several States.[2] The 1970 amendment to the original legislation gave greater emphasis to the need for such planning at local governmental levels.

These two general thrusts of the federal legislation provided direction to the States with regard to their solid waste management programs. The 1965 legislation was directed towards the Department of Health, Education, and Welfare (HEW) and the Department of the Interior. Under this act, the Department of the Interior was given responsibility with respect to problems of solid waste resulting from the extraction, processing, or utilization of minerals or fossil fuels where the generation, production, or reuse of such waste is or may be controlled within the extraction, processing, or utilization facility or facilities and where such control is a feature of the technology or economy of the operation of such facility or facilities. The 1970 legislation retained this dual responsibility, and when the Environmental Protection Agency (EPA) came into existence in December 1970, HEW authority was transferred to EPA.

The role of the Department of the Interior regarding solid waste problems corresponded with already established functions of the Bureau of Mines related to the search for new and/or wider uses of resources, the development of substitutes for existing resources, and higher recovery of material from original or secondary sources. These functions already included the recovery of scrap and its preparation for reuse.[3] However, secondary material recovery research conflicted with the primary emphasis of the Bureau — the development of new virgin raw material sources and technology. As a result, secondary material technology has received less emphasis.

The basic purposes of the 1970 act were stated in Section 202(b) and are repeated here. These purposes were:

(1) to promote the demonstration, construction, and application of solid waste management and resource recovery systems which preserve and enhance the quality of air, water and land resources;

(2) to provide technical and financial assistance to States and local governments and interstate agencies in the planning and development of resource recovery and solid waste disposal programs;

(3) to promote a national research and development program for improved management techniques, more effective organizational arrangements, and new and improved methods of collection, separation, recovery, and recycling of solid wastes, and the environmentally safe disposal of nonrecoverable residues;

(4) to provide for the promulgation of guidelines for solid waste collection, transportation, separation recovery, and disposal systems; and

(5) to provide for training grants in occupations involving the design, operation, and maintenance of solid waste disposal systems.

PROGRAMS

Prior to the federal legislation of 1965, only two States had evolved administrative programs for solid waste management. The federal legislation program provided the direction for the existing programs among the remainder of the States.

The early planning guidance given by the federal government to the States did not take into consideration the highly variable factors affecting solid waste management problems in each State. Each State is relatively unique in size, physical land characteristics, geology, economic development, and population distribution. States also have developed relatively unique administrative frameworks based upon their constitutions and the directions of their State Legislatures. As a result, each State also has given differing types of authority to local governments, both state subdivisions or counties and municipal corporations, and the primary solid waste management concerns rest with the kinds of services being provided within these local jurisdictions.

Much of the early federal effort focused upon the development of technology for improving solid waste collection and disposal practices. These early efforts also called for state planning activities with emphasis upon regional approaches to solid waste management.

The federal government encouraged the States to develop planning programs oriented towards regulatory and technical assistance functions. Emphasis was given to the development of common disposal site standards throughout each State, and the sanitary landfill was advocated as the acceptable form of disposal site. Technical assistance focused upon the presentation of engineering requirements desired for solid waste disposal sites and emphasis was given to the technology that met the regulatory aims with minimal consideration of costs.

Early federal activities were marked by energetic efforts to encourage the States to solve their solid waste management problems. State solid waste management agencies tended to reflect the federal view of the problems in their regulatory and technical assistance efforts. The administrative structures of the state agencies also tended to reflect the federal view. The early views of solid waste management requirements have been gradually changing as the complexities of these problems within each State are becoming apparent.

The Office of Solid Waste Management Programs currently is conducting a reevaluation of its role. Efforts are under way to strengthen its administrative structure based upon the management capabilities needed to perform its function. The States, too, are beginning to reevaluate their administrative programs and the management capabilities required to effectively perform needed services.

2. Solid Waste Characteristics

DEFINITION

The Task Force concluded that the States should be concerned with all forms of solid waste and chose to accept the definition of solid waste as: useless, unwanted, or discarded material with insufficient liquid content to be free flowing. In an economic sense, such materials are worthless (see "Some Solid Waste Terms and Concepts," page 46).

SOURCE CLASSIFICATIONS

Various classifications of solid waste by types and sources have been developed within recent years. The use of one classification procedure over another essentially depends upon the purposes of the user organization or agency. For example, an agency concerned with the collection and disposal of solid waste from municipalities may choose to broadly classify sources of solid waste as residential, commercial, institutional, industrial, and agricultural. Because of a primary concern for handling problems, the local collection agency may identify the types of solid waste by such terms as bulky, yard, hazardous, or special wastes.[4] Many local governmental agencies find such terminology useful for evaluating their operational requirements.

Private collectors may use many of these same terms but often will apply their own definitions to each. As an example, the EPA definition of commercial waste is: "solid waste generated by stores, offices, and other activities that do not actually turn out a product." A private collector, thinking in terms of his equipment requirements and operational efficiency, would tend to include waste from sources such as retail stores, office buildings, banks, service stations, apartments of more than four units, hospitals, and schools as commercial waste.[5]

State administrative concern for solid waste management problems differs from the concerns of solid waste service system operators—public and private. The classification of solid waste by sources and types for state-agency or public-body use must be oriented towards the needs of all three major segments of state government—administrative, judicial, and legislative. Efforts towards this end have recently begun in some States, and as state-level interagency coordination increases, fairly complex information systems will be required.[6]

The Environmental Protection Agency also recognizes this problem. As a result, the EPA is developing a new classification of solid waste defined according to areas of federal concern. The Office of Solid Waste Management Programs has categorized solid waste into three major classifications. The EPA presently feels that federal management efforts should concentrate on very hazardous wastes, termed Type 1 wastes. The identification of Type 1 waste sources and the further definition of materials to be included within this classification presently are being determined through contractual studies.

VOLUME

The types and volume of solid waste generated within an area depend upon the size and density of the local population and economic activities within that area. In major metropolitan areas larger per capita volume of solid waste will be generated and will require collection than in small municipalities or rural areas. As the population density decreases, the size of private landholdings tends to increase. In addition, rural populations apparently tend to discard less solid waste than urban populations. This is partly due to lower standards of living but also to the greater availability of larger landholdings upon which to discard waste materials.

Based upon information developed in 1967, an estimated 3.65 billion tons of solid waste are generated annually in the United States. This volume can be expected to increase to 5 billion tons by 1980. The study also determined that urban areas, including domestic, municipal, and commercial sources, produced about 7 percent of the total volume of generated solid waste. In addition, manufacturing industries produced 3 percent, agricultural activities produced 58 percent, mineral industries produced 31 percent, and federal establishments generated about 1 percent of the total.[7]

When manufacturing industries are considered as part of urban area environments, the results of the 1967 study indicate that in urban areas domestic or residential waste accounted for about 35 percent of the solid waste generated; municipal generation sources represented about 12 percent; commercial sources, 23 percent; and manufacturing industries about 30 percent. A national study conducted in 1972 indicates that residential solid waste accounted for about 45 percent of all collected waste; commercial sources, 29 percent; and manufacturing industries about 26 percent of the total collected tonnage.[8] These two studies are not directly comparable, but they generally indicate the major sources of solid waste generated within urban environments.

From the 1967 study, the volume of solid waste

generated by the four major urban area sources represented about 10 pounds of waste per capita per day. The results of the 1972 study indicate that slightly less than 9 pounds of solid waste per capita per day was being collected from major urban centers. Assuming that about 25 percent of the solid waste generated in metropolitan areas is not collected, then the total generated volume would be nearly 12 pounds of solid waste per capita per day. However, no information is available to determine the volume of solid waste routinely hauled by private individuals or industries to disposal sites. The volume and types of solid waste being disposed of privately on private land also are unknown.

The volume of solid waste being generated throughout the Nation has been noticeably increasing apparently due to the character of our consumptive society. The demand for higher standards of living requires continued economic activity expansion, and convenience goods have been widely accepted by consumers. This acceptance has stimulated industry to continually seek new entrepreneurial areas which will further increase consumer acceptance of their products. The resulting proliferation of consumer goods results in a larger volume of consumer-produced solid waste. The increased industrial activities required to satisfy the consumer demand also result in increased mining and manufacturing industry wastes.

VARIABILITY

At the same time that the volume of commodities and resultant solid waste have been increasing, their characters also have been changing. Within recent years, countless new materials have been created and many older types of materials have been fundamentally altered by technological processes. As these materials pass through their useful stage and become solid waste, their different characters, complexities, or dispersion make them difficult to reuse or recycle, and their potential hazards to the public health and the deterioration of the environment are often unknown. All of the products of our Nation's industrial complex eventually are discarded, and much of the solid waste generated from these materials enters the waste streams of large and small communities in every State.

The industries that produce the required commodities generate widely varying quantities and types of solid waste. Very often, especially among chemical industry establishments, both the types and volume of solid waste will vary according to the dictates of numerous economic factors. The types and quantity of these wastes also will vary according to the economic implications of the power and persistence of pollution control agencies. However, the technology exists to establish processing steps to remove impurities so as to enable a local water pollution control agency to prevent the discharge of waste into local waterbodies. This may result in the unwanted material being converted into a gas or particulate matter and discharged into the air; part of it also probably will be converted into a solid residue and discarded as solid waste.

The original danger of the material that was objectionable to the water pollution control agency may not have changed much. As a solid waste, the material will be deposited on or within the land at either a public or private disposal site. There, rain and natural leaching processes will gradually move these materials through the soil and into nearby surface water or groundwater.

Many industries have the capability of altering the physical form of waste materials. As a result, solid waste management, water pollution control, and air pollution control measures cannot be fully effective unless closely coordinated.

3. Environmental Concerns

The numerous individuals, agencies, and organizations actively engaged in providing solid waste services or regulating these services are primarily interested in regulatory procedures and engineering mechanisms required for their purposes. These practitioners are primarily concerned with the application of existing knowledge or techniques to current problems. The development of new knowledge or investigating the complexities of solid waste management problems beyond their spheres of interests normally conflicts with their primary functions and cannot be undertaken as part of their routine functions.

The environmental research investigations described in this chapter require an intermixing of pure and applied levels of research related to technical aspects of environmental problems. At the same time, this technical information also requires intergovernmental coordination efforts both to seek acceptable technical solutions to problems and to effectively apply the newly developed information to specific problem areas within each State.

PROBLEM STATEMENT

Some members of the Task Force indicated that the group's solid waste management concern should be defined as separate and distinct from those aspects of solid waste that become air and water pollution problems. These views apparently anticipated that adequate legislation exists in relation to air and water pollution control needs. At the same time, enforcement legislation for non-air and non-water polluting aspects of solid waste on the federal level and within a number of States presently does not exist or is inadequate.

This segmentation of the solid waste management problem is useful and permits recognition of differing areas of the general solid waste management problem that must be treated. This view is only partially satisfactory in anticipating that suitable enforcement tools exist with respect to the water pollution part of the solid waste management problem.

The practical intent of the amended Federal Water Pollution Control Act still emphasizes the development of state planning programs with respect to control of discharges into surface waters. The federal planning requirements imposed upon the States do not sufficiently address planning needs with respect to groundwaters. A planned program to understand the problems associated with the groundwater, its movement; the chemical and biological changes occurring within the water during movement; sources of pollution to groundwaters (especially trace elements); the effects of these pollutants upon local soils, bedrock formations, and groundwaters; and the effects of soils, bedrock, and groundwaters upon the pollutants does not exist. Therefore, an enforcement program aimed at groundwater pollution caused by leachates from solid waste disposal sites would lack required legal uniformity and would be subject to capricious administrative and, perhaps, legal decisions.

The water pollution potential of solid waste disposal practices is primarily a groundwater pollution problem. Therefore, while the Federal Water Pollution Control Act may provide some measure of direction useful for controlling surface-water pollution from disposal sites, the groundwater problem remains essentially undefined, and the magnitude of the problem remains unknown.

The determination of deleterious effects of leachate emanating from solid waste disposal sites is an extremely complex, technical evaluation (see "Solid Waste Caused Pollution," page 51). Early evaluations of solid waste leachates concentrated on the biological fraction of the leachate and those chemical constituents known to degrade surface waters.

More recently, studies have begun to determine the more subtle factors resulting in groundwater supply degradation such as elements of trace metals, persistent pesticides, and other organic compounds. Basic evaluations are needed to determine their breakdown rates, their fixation in soils, their uptake from the soils by agricultural crops and pasture grasses, and their distribution through higher forms of our food chain.

The deleterious environmental effects of some organic and inorganic materials are now being determined. However, many years of research will be needed to determine localized environmental tolerances for many materials, regardless of whether they are discharged initially into the local environment as a liquid, solid, or gas. It will also require many years of research to find those localized environments where the discharge of waste has extended beyond the localized environmental tolerances, has made the use of groundwaters from those areas hazardous to human and other forms of animal life, or has contaminated the localized vegetation upon which each depends. Such areas can be expected to exist, especially within heavily industrialized areas of the United States and in those agricultural areas where there has been heavy reliance upon chemical pesticides and chemical nutrients for long periods of time.

The recovery of environmentally deleterious materials

need not necessarily require economic-use justification to warrant their recovery from solid waste. The costs of such recovery must be borne simply to retain the livability of local environments.

The number of such substances that either should not be released indiscriminately into the natural environment or should be released under strictly controlled conditions is still imperfectly known. These substances would include elements, radicals, and compounds of materials now being considered by the EPA as Type 1 wastes or very hazardous wastes in liquid, solid or gaseous forms (see "Federal Definitions of Solid Waste," page 47).

In the United States, we have tended to view the first-reported dangers of such materials with skepticism and resistance. In the area of solid waste disposal, little attention was given to the danger of heavy metals, for example, during the first five years of the federal solid waste program.

It must be emphasized that by processing solid waste we may change the form of a material but we do not create nor destroy the elements that had been combined in its construction. We can recombine these elements to form new compounds, and we can remove elements and release these in forms which may or may not allow them to easily recombine with other materials in nature. Depending upon the process, some substances that were not very soluble in their original waste form may be made highly soluble by the processing technique used. Other substances may be made relatively insoluble by the processing technique. Typical solid waste reduction methods in use today include incineration, pyrolyzation, and shredding or grinding. Little is generally known of the potential environmental deterioration effects of wastes altered by these processing methods.

Much information has been developed relating to the effects of these processes at specific study locations. This information, in some cases, has been withheld from public distribution because of conflicts with agency policies. In other cases, the information has been withheld or distributed in a limited manner for economical reasons. In addition, much of the information is highly technical and cannot be easily used in its present form by operators or government regulatory agencies. Finally, because the research conducted in some local environments may not be valid nationally, corroborating evaluations under different environmental conditions are necessary for the information to have general applicability.

During the early investigations in solid waste, much was made of the incineration process as the practical way to render the solid waste material harmless and at the same time reduce it to a small volume. In those days, the research efforts concentrated upon biological vectors and possible pathogens carried by these vectors. Little thought was given to the release of organic and inorganic chemical elements and compounds; and these are proving to be, as recent worldwide investigations are showing, more hazardous to the public safety and health than the first-investigated biological hazards.

In 1973 we have little information on the long-term public safety and health hazards and environmental deterioration hazards being created by the disposal of solid waste – in manufactured or processed waste forms – from governmental or industrial sources – either on or within the land surface – in any part of the United States. The fundamental information on the materials, their deterioration processes, and the characteristics of the local environments in which they are discharged simply has not been developed.

PROGRAM REQUIREMENTS

The research and investigations necessary are extremely complex and will require large-scale and long-term efforts of interdisciplinary natures that are still not widely accepted by the various professions and academic disciplines. Academic institutions often have been unable to overcome internal constraints sufficiently to permit genuine interdisciplinary teaching and research. The federal government still has not accomplished integration of research among the various administrative departments, and state governments normally lack research capabilities. In each case, special interest groups that reflect attitudes of restrictive segments of overall solid waste management problem areas have encouraged definition of the problem from their interest perspectives. For example, a solid waste management agency can be in conflict with a water pollution control agency of the same government. As a result, neither may choose to investigate the interface problem where solid waste becomes a water pollution problem. A general or broad evaluation with priorities established according to an overall national need still is lacking.

The combined research capabilities of the federal government will be required to establish the necessary parameters within which the general health of the Nation's population can be assured protection (see "A National Research and Technology Development Program Concept," page 39). For example, the Department of Agriculture must realistically cooperate with the Department of the Interior and the Environmental Protection Agency. In fact, the physical science elements of all present departments of the federal government probably would have to be coordinated through a single administrative mechanism in order to assure that the necessary research is conducted in complementary and compatible manners by the most efficient means. The research results then must be freely distributed throughout the federal government, to the States, and to the general public.

As a further problem, in many governmental agencies the research elements must compete with the line function of the agency. For example, EPA is primarily a regulatory agency and the functions of regulation differ from those of basic or applied research. Even in areas of applied research required for technical assistance efforts, the functions of the primary agency oriented towards regulation and enforcement and the individuals within that agency will tend to bias the applied research and subsequent technical

assistance towards the primary agency goals. This orientation may not necessarily be in the best interest of state and local governments and the population within each such area. Moreover, the research efforts may be oriented towards the achievement of agency goals without regard for their relation to functions of other governmental agencies, federal or state, and this restricted perspective can produce research results and agency functional policies that are less than adequate or contradict the efforts of other agencies.

The historic pattern of non-communication between agencies of government, both within the federal government and within state governments, and the tendency to duplicate technical capabilities within each agency often result in contradictory policies that detract from each agency's and each government's effectiveness. Every possible avenue must be explored to improve interagency cooperation within governments. Improved intergovernmental cooperation will be a result of such efforts.

The development of a strong national policy upon which to base a comprehensive federal role related to national solid waste problems is essential. Such a policy also would provide clear guidance to the States for establishing statewide solid waste management policies and programs. This latter effort then would give local governments the guidance they need as they provide or have provided the necessary solid waste services to their respective residents. Also through this process, the critically needed combined federal-state program applicable to the general industrial solid waste problem in the United States, with specific emphasis upon hazardous wastes, can be effectively developed.

4. Our Concentrated Population

As members of the Task Force described the character of their respective States, the differences between eastern United States and the western half of the country became apparent. Further discussions illustrated the general urban-rural differences within each State and implications of these characteristics upon the severity of localized solid waste management problems. While this chapter emphasizes differing state problems due to population concentrations, the reader should recognize the relationship of population to the differing economic activities and physical land characteristics in each State.

METROPOLITAN BELTS

As urban development continues in the United States and more and more people concentrate in metropolitan areas, the problems of handling and disposing of solid waste within these areas will increase. Solid waste disposal problems have become acute in the larger urban centers of the United States. The problem is most acute in the large metropolitan belts, called megalopolises, existing or developing in parts of the United States. Four major megalopolises are now recognized and their metropolitan characters occupy parts of 17 States. The oldest of these is the Boston to Washington metropolitan belt that includes parts of Virginia, Maryland, Delaware, Pennsylvania, New Jersey, New York, Rhode Island, Connecticut, and Massachusetts. The second megalopolis essentially extends between Pittsburgh and Chicago. This is a less densely populated metropolitan belt that includes parts of Pennsylvania, Ohio, Indiana, Illinois, Wisconsin, Michigan, and the Province of Ontario, Canada. The third major metropolitan belt is contained within California and includes the area between San Francisco-Oakland and San Diego. The least developed megalopolis is emerging in Florida and includes the area of that State between Jacksonville, Tampa, and Miami.

All other large urban centers in the United States are relatively isolated with surrounding rural environments. Even in Florida, large rural gaps will persist for some years between the major urban centers.

POPULATION DENSITIES

Just prior to the 1970 Census of Population, the U.S. Bureau of the Census recognized 233 standard metropolitan statistical areas (SMSA's) comprised of 450 counties in the United States. Standard metropolitan statistical area counties must contain at least one central city with a population of 50,000 inhabitants or two or more twin cities with a combined population of at least 50,000 persons or a contiguous county with a metropolitan orientation towards the central city. These SMSA counties contained about 70 percent of the total 1970 U.S. population. At the same time, their combined areas represented only 13 percent of the land area of the United States, excluding Alaska and Hawaii. This combined land area with almost 140 million inhabitants is roughly 400,000 square miles in size; and area about seven times the size of Florida or seven-tenths the size of Alaska.[9]

The population density among the 450 SMSA counties averaged about 350 persons per square mile (p.s.m.). This is nearly six times greater than the nationwide average of 58 persons per square mile; it is also about one thirty-fifths of Washington, D.C.'s population density.

The States with the greatest population densities are those which contain the Nation's oldest megalopolis. Those States with population densities greater than the SMSA county average are: Connecticut, 624 p.s.m.; Maryland, 397 p.s.m.; New Jersey, 953 p.s.m.; New York, 381 p.s.m.; and Rhode Island, 906 p.s.m.[10]

Seventeen States recorded average population densities of more than 100 persons per square mile in 1970. These included all of the States recognized as megalopolis oriented, with the exception of Wisconsin; Hawaii was the one nonmegalopolis-oriented State included. Ten other States had average population densities greater than the national average. Only two of these, Missouri and Louisiana, are located west of the Mississippi River.

Those States with recognized megalopolis development and Hawaii probably have very severe solid waste disposal problems within their metropolitan belts. However, all those States with very large and growing urban areas can be expected to have severe metropolitan area solid waste disposal problems due to their population concentrations, intense economic activities, and the numerous local governments within the urban areas.

The solid waste management problems throughout roughly 87 percent of the land area in the United States are those of very small communities with limited manufacturing industries. In this area, solid waste from agricultural industries, including forestry or mineral industries, will tend to be the major concern of local governments.

5. Local Governments

This chapter reflects the single most critical issue facing state governments with respect to improving solid waste services. Local governments are the backbone of our entire governmental institutional structure. Their strengths and their weaknesses determine the quality of services provided to the people of the United States.

While the Environmental Protection Agency may be primarily interested in insuring that an acceptable level of service is provided to inhabitants by these governments, the average United States citizen, local governments, and the States must be concerned with the costs of these services as well as the desired quality. Provision of acceptable services without regard for improving the efficiency of these services is an impossible and unacceptable task. The citizens of the United States are now revolting against inefficient government (note our school system as one example) in some parts of the Nation. While improved solid waste services are necessary, increased efficiency in the delivery of these services must accompany their improvement. This chapter summarizes one of the major factors presently limiting the expansion of efficient solid waste services throughout much of the United States. This chapter must be read in perspective with Chapter 4.

PURPOSES AND FUNCTIONS

The States have created subdivisions (county- and township-level governments) to perform functions for the States such as the maintenance of vital and property records, tax collection, road repair, and similar tasks. Their governments are structured and powers are delegated for these purposes through state constitutions and legislative statutes. Where degrees of self-determination and improved urban services have been desired by groups of local inhabitants, State Legislatures have granted these groups selected governmental powers through charters creating municipal corporations. Depending upon the State, these municipalities may be termed towns, villages, boroughs, townships, and/or cities. The powers of these local governments generally are restricted to those granted in express words, those implied by the powers expressly granted, or those essential to objects or purposes of the granted powers. Only Alaska, and perhaps Texas, have granted counties residual powers and allow these units to perform governmental functions not expressly prohibited by the constitution or Legislature.

All local governments must depend upon the State as their source of authority. The States establish the provisions governing the form of government, the powers, and the political boundaries of local governments. A State's legislative prerogatives cannot be limited by acts of its Legislature. Therefore, any power given to local government by the Legislature is on trust that it will be used for the public good. At any time, a State may withdraw such a granted power.[11]

The high degree of variability in form and function of local governments precludes specific delineation of their powers. Similarly, the importance of the basic types of local governments varies throughout the Nation. Typically, as municipal corporations increase in number and expand their jurisdictional areas through annexation, the county in which these units are located will tend to diminish in importance. This is the case in much of northeastern United States; and in Connecticut and Rhode Island county governments have been dissolved. At the same time, counties are the predominant general purpose governments in rural areas of the southern, central, and western parts of the United States.

State subdivisions typically do not have the administrative structures for providing urban services, such as solid waste collection and disposal. In metropolitan areas and other areas where the county-level government predominates, these units have had to accept this responsibility. These governments generally will require substantial management, and technical and financial assistance from state governments if they are to be expected to perform such necessary urban service functions.

Municipal corporations requested and obtained charters from State Legislatures for the express purpose of providing urban services to residents of their jurisdictions. In accepting these charters, municipal corporations have obligated themselves to provide these services.

At times State Legislatures may have granted these charters without regard for the municipal corporation's ability to provide adequate services. In many cases, charters were granted by State Legislatures many years ago when the municipal corporation was a viable entity. No mechanism exists in state government to assure that these units of local government have maintained their capabilities for providing adequate levels of services.

States have placed numerous procedural and methodological restrictions upon the substantive functional powers of local governments. Many of these restrictions appear unreasonable in the light of today's demands upon local government. Some have been state responses to the misuse of authority, but many also reflect legislative conservatism and the lack of awareness of the consequences of strict

judicial interpretation.[12] At times local governments, in response to strict interpretations of their powers, have not considered the provision of solid waste collection and disposal services as a welfare function of government and of their concern. As a result of our governmental traditions, local interests, and local competence, many local governments are not equipped to provide solid waste collection and disposal services.

SOLID WASTE MANAGEMENT RESPONSIBILITIES

The provision of adequate levels of solid waste services should be accepted responsibilities of local governments in the United States. Improvements are needed in these services in most States. Too often, services provided are not performed in a manner that both adequately protects the public health and the quality of local environments.

In many cases, local governments provide for limited levels of services within their jurisdictions. Very often, selected residents and many industries (including commercial and service industries) are not provided with these necessary services. In addition, many local governments make little effort to regulate the level and quality of these services when they are privately provided.

SIZE LIMITATIONS

While the majority of the inhabitants of the United States live in metropolitan areas, we are still a nation of small communities, and the vast majority of our local governments serve very small populations. In the direct provision of solid waste collection and disposal services, local governments approximating 30,000 inhabitants can be expected to provide quality services at reasonable costs.[13] For example, effective collection systems can be operated by local governments ranging downward to population bases of perhaps 10,000 people.[14] Costs will tend to be higher and services may be spartan but adequate. In part, the difference between adequate and inadequate services often has been determined only by the demands of the local population and not by state government-determined public health and environmental protection standards. Similarly, reasonable rates are determined by the willingness of the public to pay for the services and their recognition of the services' costs. Most local governments in the United States do not keep accounting records that permit clear determination of all costs for a governmentally operated solid waste collection and disposal system (see Chapter 8).

Local governments with smaller populations and economic bases can provide adequate services at increased per capita costs, but reductions in the levels of services provided are more common. Many local governments are too small to justify the costs of directly providing solid waste services. Conversely, when the local population base approaches 50,000 persons, economies of scale in the provision of these services normally can be expected.

The metropolitan areas of the United States normally include many small local governments. The average SMSA includes about 2 counties, 14 townships, and 22 municipal corporations. As examples, the Cleveland SMSA includes 4 counties, 43 townships, and 89 municipalities; the Louisville SMSA includes 3 counties, 17 townships, and 57 municipalities – in 1960, 41 of these municipalities had populations of fewer than 1,000 inhabitants.

A 1970 study of 2,970 counties in the United States, excluding Alaska and Hawaii, showed that only 660, or 22 percent, contained more than 50,000 inhabitants; about 60 percent of all counties in the United States had fewer than 25,000 inhabitants.[15] This same study showed that only 20 percent of the counties in the U.S. had principal cities with more than 25,000 inhabitants in 1970; 31 percent of all counties had principal cities with populations of fewer than 2,500 inhabitants. Finally, over 24 percent of the counties in the U.S., about 722 of the counties included in the study, recorded total populations of fewer than 5,000 inhabitants.

Based upon 1970 U.S. Bureau of the Census information on the 20,768 incorporated places in the United States, only 7,061, or 34 percent, had populations of more than 2,500 inhabitants and were considered urban places (66 percent of all municipal corporations served fewer than 2,500 inhabitants). Information from this source indicated that only 36 percent of the U.S. population lived in the 396 urban places (municipal corporations) with more than 50,000 inhabitants. Another 9 percent of the U.S. population lived in the 519 urban places with between 25,000 and 50,000 inhabitants.

Slightly less than 29 percent of the U.S. population lives in unincorporated places with services provided by state subdivision (county-level) governments. About 26 percent of the total U.S. population lives in municipal corporations of fewer than 25,000 inhabitants. Of these municipal corporations, 16,629, fully 80 percent of all incorporated places in the United States, have populations of fewer than 5,000 inhabitants.

In many States, the rural population being served solely through county governments is decreasing. In metropolitan areas, suburban population expansion is forcing county governments to provide urban services, such as solid waste collection and disposal services, under restrictive authorities and administrative structures not intended for these purposes.

Throughout the Nation, many incorporated places continue to persist beyond their original reason for existence. Even with contracting populations, such incorporated places are faced with increased urban service demands while their economic bases and fiscal capabilities diminish. As this occurs, administrative and managerial competence also tends to decline even as the need for more effective management capabilities are needed.

The vast majority of local governments will not be able to directly provide solid waste collection and disposal services for their inhabitants at reasonable costs. Most will have to arrange for the provision of this service through contractual agreements, including franchise agree-

ments, with the private sector; the transfer of this service function to another government; interlocal agreements or contractual arrangements; participation in a public authority or utility system; participation in a nonprofit service corporation; or the participation in a special service district.

In very rural areas, especially the 24 percent of all counties in the U.S. with fewer than 5,000 inhabitants, the provision of solid waste collection services, and probably disposal services, by local government is impractical. Similarly, both the amount and quality of solid waste services can be expected to be lower in the very small municipal corporations.

Where very small municipalities are located within a metropolitan environment, they may be reasonably affluent bedroom communities. Such municipalities may be able to afford to obtain essential solid waste collection and disposal services. In many such communities the general citizenry actively participates in the functions of their government. Too often, these municipal corporations exist as a protection against resident property annexation by the larger central city, and residents may express their independence or fear by refusing to cooperate with other municipalities. Large numbers of such small municipalities often surround central SMSA cities and tend to frustrate the development of uniform and efficient solid waste services within metropolitan areas.

The problem of small municipalities in rural areas often is very different from the small city within a metropolitan area. Rural-oriented municipalities often are vestiges of the area's former agricultural or natural resource exploitation importance. The inhabitants of these small places may desire improved urban services but typically lack the finances and administrative-managerial ability to obtain them. Very often, a community's remoteness precludes the possibility of coordinated interlocal governmental activities to provide solid waste collection and disposal services.

Probably less than 50 percent of the U.S. population lives in areas with local governments of sufficient size to permit direct provision of solid waste collection and disposal services at reasonable cost. The other half of the Nation's population will have to contract for services, or otherwise allow someone else to assist them or provide the service for them, or they may do without adequate collection and disposal services. If improved services are to be enjoyed by the residents of most local governments, and these represent a large segment of the Nation's population, strong state legislative action will be necessary to permit and encourage local governments to develop coordinated mechanisms for the provision of these services; in some cases, direct state action may be necessary.

6. Solid Waste Management: Operations

The Task Force was concerned with establishing a state government perspective of solid waste service operations. Much technical information has been published by the Environmental Protection Agency and state government solid waste management agencies on various aspects of solid waste service operations. Very little information, however, exists that illustrates the different kinds and extent of services normally being performed by various government agencies and private entrepreneurs in any given urban area. The recognition of this fragmentation of solid waste collection and disposal services and its resultant problems are outlined in this chapter.

OPERATORS

Within any large urban area, a wide variety of activities centering about the handling and disposal of solid waste routinely occurs. There exists in urban areas an uncoordinated but operational solid waste service system with various levels of government and with private sector participation. This functional system includes all those public and private activities required to store, collect, transport, process, and dispose of solid waste from or within any given urban area. For much of metropolitan United States, the components included within local area functioning service systems have not yet been identified and categorized and, therefore, only parts of the functioning systems are generally recognized.

When referring to the collection part of the functioning service system, collecting and hauling solid waste is a routine activity performed by many different individuals and groups. For example, state agencies, such as highway departments, routinely collect litter from state and federal highways or remove debris remaining from roadway construction and repair sites. Other state agencies, such as parks and forestry departments, routinely collect various types of solid waste material within the areas of their jurisdictions.

Local governments normally collect solid waste from residents and selected businesses within their jurisdictional areas. Local street departments collect trash from local roadways, street-sweeping waste, or debris remaining from local road repair projects. Other local government clean-up crews collect various types of refuse from parks and other public areas or places.

If federal government facilities or installations occur within a functional solid waste service area, the responsible agency may also perform collection services within the area of their jurisdiction. The Department of Defense, U.S. Park Service, and the U.S. Forest Service are typical of federal agencies that often provide their own solid waste collection and disposal services.

A number of private contractors probably operate within an urban service system and collect a wide variety of waste materials. Private operators handle about 73 percent of all solid waste tonnage collected in the Nation. The private sector collects roughly 50 percent of all residential waste, 91 percent of all commercial waste, and about 94 percent of all manufacturing industry waste that is collected in the United States.[16] These operators are not concerned with political boundaries; they service customers, in competition with other private operators, within an area established primarily by economic parameters. Government restrictions, competition, the cost of providing the service, and the clients' ability and willingness to pay for the service normally determine operational areas for private concerns.

Over 10,000 private contractors serve the communities and customers within local areas across the Nation, but most are very small contractors. Over 70 percent of the private contractors operate with fewer than five collection vehicles and these service fewer than 20 percent of the private sector's customers. Many of these small operations provide specialty collection services to various types of industries, but others compete for collection territories consisting of small segments of nearby residents. Small specialty operators provide an almost unique service by tailoring their operations to the peculiar needs of selected local industries. But some small operators are marginal economic enterprises that provide minimal levels of service, often operate with faulty equipment, and sometimes operate with questionable ethics. Such concerns have been tolerated only because of the traditionally low stature of solid waste and the industry.

As States recognize the need for greater regulation of solid waste collection and disposal practices, the need for efficient operational management is becoming apparent. Private businesses have been merging in recent years and large organizations are beginning to emerge; these can offer efficient and dependable collection services to the public. Large-scale enterprises can only flourish within well-defined environmental regulations that establish and demand dependable and quality services. Improved solid waste service systems operated by governmental agencies have similar requirements.

Large-scale industries depend upon their superior administration, operational management, and technical competence to provide needed services. Because they are large and have the necessary capabilities, they can obtain essential financial support to improve and expand their services. This recent emergence of large private collection and disposal service industries must be contrasted with the

more typical very small waste collection businesses and the average municipality's capabilities for directly providing the necessary improved services.

SERVICE FUNCTIONS

Each private organization and public agency transports collected solid waste to a processing facility or disposal site. Private individuals and industries also may haul their own solid waste to these facilities or disposal sites. Little information is available to determine the general extent of these practices. Similarly, little is known about the types and volume of solid waste generated within a service system area that are disposed of by private individuals or industries upon their own property or are hauled to private disposal sites.

Municipal governments typically are concerned with providing collection services to residents and selected commercial activities but seldom provide complete services to manufacturing industries. County governments typically are concerned only with the needs of residents outside of municipal corporations. Neither government is generally concerned with the solid waste collected and disposed of from or within their area of jurisdiction by the private sector except when the materials are disposed of on publicly operated sites. As a result, a single local government agency concerned with the total mix of solid waste being generated and disposed of within any given urban area seldom exists.

In order to understand the public health and environmental hazards associated with the solid waste disposed of in any local area, it is necessary to determine the types and volume of all solid waste generated and disposed of within such an area. These are not normally concerns of either public agency or private operators whose primary functions are the provision of collection and disposal services.

Those public agencies and private organizations providing solid waste services normally operate at levels determined by the user or supporter acceptance. Those managing such services maintain that level of service which will either produce an acceptable level of profit or will result in the fewest number of complaints from both users and supporters of the service. Imposed government regulatory measures probably will be resisted if either of the above two factors are negatively affected by regulations.

Satisfaction of both service user and supporter demands normally is achieved by:

1. Setting service charge levels acceptable to both users and supporters.
2. Developing and maintaining acceptable levels of operational efficiency.
3. Seeking windfall gains such as free technical advice and low-cost financial assistance.
4. Avoiding, resisting, or preventing factors which are likely to result in operations cost increases.

In a private enterprise under competitive conditions, fees are set according to the willingness and capability of the user to pay for the service. The lower limits of the fees are determined by the requirements of the supporters of the service and the acceptable level of profit that can be obtained for its supporters.

In a public agency providing some form of solid waste service, the operational management attempts to provide acceptable levels of service. However, operational management is somewhat insulated from the user by an administrative structure of some sort. As the service system becomes larger, the degree of insulation from the system's users tends to increase with a corresponding reduction of sensitivity to the user. Under these conditions, operational management tends to become increasingly sensitive to the demands of the system's supporters – the administrative structure.

In the average city or county, the administrative structure is comprised of elected officials who are probably laymen in respect to the administrative management needs of a solid waste service system. Therefore, their abilities to make the proper demands of operational management may be somewhat limited, and they will have difficulty in determining whether the responses of operational management are, in fact, the best possible under a given circumstance.

Finally, any organization or agency that operates a solid waste service or facility necessarily must be concerned primarily with the goals and purposes of that service or facility. The protection of the public health and safety and the protection of the environment are primary functions of governmental agencies concerned with regulating solid waste service operators. Public health and environmental control regulatory measures that result in unacceptable operational costs, major changes in operational practices, or changes that are beyond the service's management capabilities (financially or technically) will be resisted by the organizations and agencies providing the services. Such resistance has been fairly widespread and has emanated from federal, state, and local government agencies. Therefore, when governments or agencies of government are principally concerned with the provision of solid waste collection and disposal services, either directly or by contract, they should not be expected to also regulate such services in accordance with the interests of state or federal government regulatory agencies. They can only be expected to provide and regulate their services in accordance with their primary interests and concerns.

Within state government, this poses the problem of how a solid waste management regulatory agency can influence the solid waste disposal practices of other state agencies. This problem is repeated within the federal government. There is little incentive for increased coordination and regulation compliance among local governments when neither the States nor the federal government can achieve interagency coordination and regulation compliance among their own agencies.

7. Solid Waste Management: Regulation

The regulation of solid waste services as a means of protecting the public health and local environments has been the main thrust of the federal government solid waste management program and most state programs. This chapter illustrates the extreme fragmentation that occurs in many, probably most, state solid waste management programs. The determination of the extent of fragmentation in any particular State requires a comprehensive examination of each State's constitution and the legislation passed over the years regarding the various aspects of solid waste (see "Solid Waste Characteristics," page 46, and "Definitions . . . by State Legislatures," page 47.) It is not necessary for a State to have passed a "Solid Waste Management Act" for it to have substantial legislatively derived powers for regulating solid waste management practices. Those States which have codified their state laws can readily determine the extent of this authority. However, many States have not codified their state legislation and, unless especially investigated by persons familiar with a State's laws, the extent of fragmentation of solid waste management authority remains essentially unknown. The development of this information is a first step in establishing an effective state solid waste management program.

REGULATION FUNCTION

The regulation of solid waste services takes many forms and requires coordinated activities among various levels of local government, between local and state government, and among agencies of state government.[17] The essential functions of government regulatory agencies include:

1. Establishing administrative regulations that contain requirements and standards to be met by solid waste service system operations;
2. Issuing various types of licenses or permits;
3. Investigating and routine monitoring of operational practices to ensure compliance;
4. Issuing, or having issued, citations or notifications for non-compliance, sometimes served by law enforcement agencies;
5. Holding administrative hearings with offending parties to obtain voluntary compliance; and
6. Initiation of litigation against the offending parties to terminate offending activities, obtain compliance with regulations, or seek redress for damages caused by the offending party.

When litigation is initiated, the matter comes under the jurisdiction of the judicial branch of government with prosecution from the executive or administrative branch. When this occurs, the prosecutor must depend upon the accuracy and legal validity of technical testimony provided by the staff of the regulatory agency.

The prosecution action may attempt to obtain simple compliance with the regulatory agency's administrative regulations. The action also may seek the maximum possible punitive measures. Under the laws of many States, the maximum punitive measures consist of fines that are insufficient to compensate for the cost of the prosecution effort or to compel the offender to comply. Establishing such ineffective punitive measures may or may not reflect public concern, but they very effectively serve notice on regulation and enforcement agencies that these laws are not to be taken very seriously.

The federal program, out of necessity, and many state programs have depended heavily upon solid waste services regulation through various moral suasion techniques. These have included the provision of:

1. Various forms of educational and informational materials and services;
2. Technical assistance with primary emphasis upon disposal site location and operational techniques;
3. Some forms of administration and operational management assistance; and
4. Some forms of financial assistance.

These techniques have been widely used in recent years as means of bringing the hazards associated with solid waste handling and disposal to the attention of local governments and to the general public. Used judiciously, each technique can assist in the regulation process by increasing voluntary compliance by operators and by obtaining support from the public. Where successful, these techniques will result in reduced requirements for the more forceful prosecution and adjudication of enforcement.

The regulation of solid waste services may occur at all levels of government. In general:

1. The federal government can develop limited regulatory measures based upon its powers under the public welfare and commerce clauses of the Constitution;
2. Under their police powers, States can develop regulatory measures, where none now exist, to complement those delegated to local governments or in place of those already delegated to local governments; and
3. Municipal corporations and state subdivisions may/shall develop regulations according to the powers delegated to them by the state constitution or the State Legislature.

LOCAL GOVERNMENTS

Local governments have been delegated powers by the States to provide various activities, including forms of regulation related to solid waste collection and disposal services. Some of these powers permit local governments to provide regulation according to their interest perspectives. Selected agencies within local governments also are obligated to provide regulatory functions according to the State's perspective. In addition, the level of authority given to local governments, or the degree of authority assumed by the State, varies among the different segments of the services provided by local governments.

Collection

Local governments normally regulate by ordinance the solid waste collection services they choose to provide. Ordinances of cities often specifically deny governmental collection services to residents of multi-unit dwellings, large commercial establishments, and manufacturing or other industries located within their jurisdictional areas. Such ordinances also may deny services to single-family residences within their jurisdictions when these residences are relatively isolated or are otherwise inconveniently located.

Local government ordinances establish the population to be served and various requirements of the services to be provided. These include the form or quality of the services to be provided, the obligations of users of the services, and the fees charged or taxes levied for the services.

The quality and costs of services provided essentially are those agreed upon by the majority of local residents, and their satisfaction or dissatisfaction is registered through the election and retention of the services' administrators. In most communities, citizen power restricts the efforts of administrators from drastically altering the quality and costs of locally provided services. Therefore, the services provided in local areas across the United States generally reflect communitywide attitudes and interests.

When solid waste collection services meet essential public health protection requirements, local self-determination reflects well upon our governmental system. In many small communities and counties, however, the local governments do not provide collection services for inhabitants. The question then becomes one of determining what actions, if any, state government should take to ensure that these segments of the State's population can enjoy a minimum safe level of public health and environmental protection. As a corollary question: What state mechanism exists to ensure that local governments maintain the operation of their collection services in a manner that conforms to some minimum public health and environmental protection standards?

Throughout much of the Nation, local health departments function as the regulatory mechanism to administer state health laws. Local health departments often use local enforcement agencies and the local prosecution and adjudication systems to obtain compliance. In some States this system works well and is satisfactorily impartial. In other States, and in many very small jurisdictional areas, the system is biased toward local interests and against outsiders; this may be the state government.

While the extent of such biases varies from State to State, there is a tendency for local interests to become more and more prevailing as the population size of the local jurisdiction decreases. Therefore local health departments are often placed at a disadvantage in regulating health aspects of local solid waste collection services when local prosecution and adjudication mechanisms predominantly reflect local attitudes. Further, local health departments must obtain much of their operating funds from local government administrative boards. These are often the same boards that are responsible for the management decisions of the solid waste services that the local health department must regulate.

Disposal

In many States, local health departments are responsible for regulating both public health and environmental protection factors related to solid waste disposal. A number of States have removed the environmental protection responsibilities from health departments and have placed these functions within some form of environmental protection agency. This has occurred partly because of limitations of local health departments to regulate from the perspective of state requirements. The change has also been prompted by health department emphasis upon corrective medical programs in contrast with environmental protection oriented prevention programs.

Local governments are primarily concerned with solid waste disposal sites from a land development potential viewpoint. Traditionally, the local dump was located on the least desirable land, usually in some out-of-the-way place near the edge of the community. Stream banks, hillsides, gullies, and quarries have been favorite places for the location of dumps. Another typical location has been in the area near where the least-favored residents of the community live. In all such cases, the land chosen is the least valuable site available.

The primary land-use control tool used by a local government is their zoning power, and this is being applied widely throughout the United States to control the location of solid waste disposal sites. Road development policies and traffic control programs are a second major means used by local governments to control the location of solid waste disposal sites and the transport of solid waste within or through local jurisdictions. Local nuisance ordinances provide another local regulatory device.

Local land-use regulations originally evolved through the concerns of large landowners and dealers in real estate interested in maximizing the value of land as a commodity.[18] Traditional zoning ordinances with only a few use districts made it possible to determine in advance the specific type of use permitted on land. This provided a quick means for identifying categories of land for promo-

tion and sale. The early promoters of these land-use regulations made no attempt to conserve land for particular purposes or to direct them to specific uses. They typically sought only to prevent land from being used in a manner that would depreciate the value of neighboring land. Where development would not harm property values it went unregulated. These fundamental interests prevail today in the application of zoning ordinances in many localities throughout the Nation and are being widely used to restrict the location of solid waste disposal sites.

While land developers consider land as a commodity, conservation and ecology groups view land as a resource. Both groups view solid waste disposal sites in the context of the familiar obnoxious dumps characteristic of large and small communities across the Nation. Environment-oriented groups also see disposal sites as major surface water and groundwater polluters which are defiling the local natural environment. Land developers willingly use this concern to prevent the location of disposal sites on valuable land.

Local health departments recognized that open dumps attract various forms of insect and animal life that could serve as vectors (see "Solid Waste Caused Pollution," page 51) and transmit diseases back to the human population. Their traditional answer to the problem was to remove the dump as far as practical from the urban population.

Since 1965 and the initiation of the federal solid waste program, state health departments generally have sought to encourage the use of sanitary landfill forms of disposal sites where the solid waste is covered each day with compacted earth. This technique serves to reduce the undesirable vector problem. As the concern for the potential surface water and groundwater pollution that might occur from disposal sites has grown, the need for relatively strict engineering standards for such sites has become recognized. Sites that can be easily engineered to both control vectors and reduce the water pollution potential normally require the use of land considered by real estate promoters as valuable commodities. Opposition to the use of such land from land developers and landowners has been severe.

Many local health departments have accepted state sanitary landfill concepts, but the long-standing tradition of locating the dump as far as practical from urban populations is now a widely accepted community view. The surface water and groundwater pollution potential also has been widely used to justify the location of the solid waste disposal site somewhere else, and sanitary landfill leachates emphatically cannot be allowed to pollute local waters. Little thought has been given to leachates that emanated from open dumps, including community and industry incinerator residue piles, for many years. Little consideration is also given to similar types of surface water and groundwater contaminates that have been released into the local environment for many years from septic tanks, cesspools, sewage treatment plant effluents and sludge piles, sewage lagoons, industrial waste-holding ponds, and other sources of wastewater. However, when it is recognized that a sanitary landfill that will reduce the local health and environment deterioration potentials requires land that has a high commodity value, and that surrounding land might depreciate in value if used for that purpose because of the traditional low esteem given to the local dump location, then the widespread problems encountered in locating solid waste disposal sites takes on a new perspective.

The Task Force recognizes that the disposal of solid waste is an acute problem in much of urban America. In many municipalities land space for solid waste disposal sites does not exist. This is a physical problem in the sense that not enough land is available for that purpose within the local jurisdictions. In some of the most densely populated municipalities in the United States, such as those approximating the density of Washington, D.C., underdeveloped land probably does not exist. However, in most communities in the United States open land within municipality boundaries does exist; land is not available for use as solid waste disposal sites because of local zoning and other land-use regulations.

From a regional standpoint, open land exists within a few miles of most major cities in the Nation. The problem is one of surrounding local governments setting up legal barriers to prevent the central city or other local governments from using their land for solid waste processing facilities and disposal sites. As an example, open land that can be safely engineered for use of solid waste disposal sites exists within a relatively few miles of Washington, D.C., but local governments in Maryland and Virginia refuse to allow the use of this land for such a purpose. The problem is not one of the danger of environmental pollution, it is a problem of the fear of depreciated property values and the long-standing attitude and fear of assuming the demeaned social status of people who must reside near the town dump. In the Washington, D.C., case, entire counties have risen up in protest over the use of their land for disposal sites.

These fears also have prompted communities to harass or legally enjoin haulers from transporting waste materials into and through their jurisdictions. Some of these actions are prompted by social attitudes towards solid waste. Some are prompted by the ineptness of the haulers who fail to control litter from vehicles, odors from the waste material, and who tend to maintain their vehicles in conditions that stimulate protest. Some of these actions use the hauled solid waste as an excuse for local action to reduce commercial vehicle traffic through their jurisdictions.

In those cases where local complaints against haulers are valid, the problem is not one of solid waste movement, but of the ineffectiveness of government commercial vehicle licensing and regulation procedures or occupational health and safety regulation procedures. Because the responsible agency is unable to function properly, local governments are being forced to protect themselves by those legal and extralegal means available to them.

In cases where the underlying reason for local action is an effort to reduce commercial traffic, a real solution to the problem is probably beyond the capability of local govern-

ment. Local indiscretions in the misuse of land adjoining traffic arteries and the desire for yet another bypass to open more property for business purposes is often behind local government harassment of through commercial traffic.

In the past, local governments demanded the construction of intercity roads through their business districts. Local businessmen long recognized the possibilities of capturing greater volumes of trade by forcing travelers through the local business district. This practice eventually choked the downtown area with traffic, and state-funded bypasses were sought and often obtained by municipalities.

Local businessmen have used these bypass roads as extensions of the downtown, have created secondary business districts, and have permited uncontrolled access to the roads. They are then forced to construct traffic control systems which choke the bypasses with combined local and through commercial traffic.

The problem is compounded when other communities try to "dump their wastes in someone else's backyard" by having it hauled to some remote location. In the process, the waste-carrying vehicles often must pass through other communities along the route. The situation becomes one of a community avoiding local solutions to its solid waste disposal problems, through community-oriented use of its land, by hauling it to a distant location only to face, in other jurisdictions, many of the same problems being avoided locally.

The combination of powerful economic interests, environmental concerns, and social attitudes has generated much of today's impetus for improving solid waste management practices. Little factual information is available on the degree to which substandard solid waste disposal sites pollute groundwater, but engineering techniques are available to control the release of contaminants into the local environment. Surface water pollution problems can be almost completely controlled through proper site location, sound engineering design, and well-managed operational practices. Open land exists in most metropolitan areas of the United States, but these cannot be used because of local government restrictions supported by local opinion.

Instead of solving disposal site problems, local governments are demanding technical and financial assistance to find means of reducing waste volumes or of hauling solid waste to the fringes of their jurisdictions. Other local governments are seeking means of hauling solid waste into other political jurisdictions. Their efforts are oriented toward political or legal solutions that will break down the barriers set up by potential recipient jurisdictions. They have not sought means of breaking down their own legal barriers set up to protect the commodity value of the land within their jurisdictions. Nor have many local governments made very real efforts to remove the long-standing social stigma attached to the town dump location in spite of recent engineering advances made in disposal site management and the complementary land improvement techniques.

In many counties and municipal corporations with very small populations, local governments are often dominated by one or a few industries and a few prominent families. In those communities where economic and political power are in the hands of a few families or industries, the needs of local residents depend upon the benevolence of the dominant interest groups and elected officials are often powerless to act.

The past indiscretions of local governments under such conditions fostered the strict interpretation of local government powers by the courts. The fear of repetition of such activities by local governments restrains many State Legislatures from granting broader and more flexible powers to counties and municipal corporations.

In some States, Legislatures are still influenced by self-seeking demands of local power groups. The recent expansion of federal controls related to air and water pollution problems was partly dictated by the inability of some States to adequately consider welfare needs of their inhabitants. A strong national policy related to solid waste management will be necessary as a mechanism to assist some state governments to more quickly respond to the needs of local governments. At the same time, similar commitments by States and local governments will be necessary if acceptable and workable regulatory policies are to be developed.

The extreme variability among the States and among regions within States precludes the development of common disposal site specification or engineering standards for the Nation. Even within federal regions, only a general federal policy could be applicable. Such a policy should consist of minimum quality standards oriented toward the protection of the public health and the natural environment upon which each State can build a coordinated program to manage solid waste practices for the benefit of all of its inhabitants.

STATE GOVERNMENT

The regulation of solid waste collection and disposal practices is usually performed by a wide variety of agencies in each State. Over the years, State Legislatures have given regulation responsibilities to agencies already concerned with various sources of solid waste. For example, agricultural departments often have been directed to regulate agricultural product producers; and these agencies also may have been directed to regulate feedlot wastes, the disposal of diseased animal carcasses, and garbage used for hog feed. Agricultural departments also often regulate waste from animal product producers such as slaughterhouses, leather manufacturers, rendering plants, and canneries.

In some States, the forest services and parks departments have been legislatively directed to regulate solid waste disposal practices within state forests and parks. In these cases, geographic areas have been designated as solid waste management jurisdictions of these state agencies. In a number of States, the highway department or department of transportation has been given authority to dispose of solid waste along state roadways and, at times, to issue

licenses to private contractors permitting their use of state rights-of-way for the disposal of some types of solid waste. A number of States have created boards or departments to regulate surface and subsurface mining operations and the wastes generated by these industries.

In many States, the recently designated solid waste management agency often has been given regulatory control over the disposal of solid waste at publicly operated sites or those operated by private collectors who service local governments or residents. In many cases, emphasis is given to the dangers of garbage and potential disease hazards from vector-carried pathogens. Most state solid waste management agencies probably have authority to regulate wastes disposed of by manufacturing industries, but few States have yet developed programs for the effective control of these wastes.

The state solid waste management agency normally is charged with the licensing of solid waste diposal sites and ensuring that they are properly designed and operated. Water pollution problems associated with sites typically come under the authority of a state water pollution control agency, and air pollution problems are the jurisdiction of air pollution control agencies. The movement of a solid waste function into an environmental protection agency does not materially reduce the need for effective interagency coordination. It does serve to permit more effective coordination efforts among the various internal agencies, but the degree of effectiveness still depends upon the managerial capabilities of the administrators of these agencies.

The solid waste management agency is concerned with disposal site operational practices to ensure that these practices conform to design standards. Operational practices related to equipment safety and the safety of employees normally are monitored by an occupational safety and health agency.

The control of vectors on the disposal site may be a part of the solid waste management agency's function, but it may also be the concern of other agencies within the state and local health department system or even a state agricultural department.

In some States, the solid waste management agency may license collectors or haulers of waste materials, but again, a number of other state agencies may perform these regulatory functions. Hauling and disposal of septic tank sludges may be regulated by a separate health department agency; the hauling of diseased animal carcasses may be regulated by an agricultural department; the hauling of hazardous wastes may require special licenses from state departments of transportation or a public safety agency. One of these agencies also may be the primary licensing agency for all highway vehicles; one also is usually responsible for insuring that highway vehicles operate within designated road-weight limits. Again, an occupational health and safety agency may be concerned with the safety of collection and haul vehicles from the standpoint of employee safety.

Where the state solid waste management agency functions from within a health department, the program emphasis may be oriented towards public health regulatory functions. When located within an environmental protection type agency, the direct public health concerns may be left within the health department and the new agency may be primarily concerned with environmental control functions.

Ultimate regulation of solid waste practices rests with the State's law enforcement agencies, the prosecution agency, and the State's judicial system. In those States with weak laws and minimum sanctions, law enforcement agencies will tend to perform only as requested by the regulatory agency, and perhaps then reluctantly. Similarly, the prosecution agency will tend to devote energies in those areas where efforts will be effective.

Apparently state-level environmental concerns are still not widespread throughout the Nation as judged by the concerns of state prosecution agencies. At the December 1972 meeting of the National Association of Attorneys General, only 16 Attorneys General indicated that their agencies were giving special attention to environmental problems; only seven indicated the establishment of environmental divisions within their departments. Where general citizen concern is strong, the prosecution agencies of state government can be expected to respond if they can obtain needed manpower and funds.

The increase in regulatory functions regarding environmental problems also dictates the need to increase the size and capabilities of an Attorney General's department. In those States where regulation enforcement is performed through the local prosecution system, federal and state assistance to expand and improve the capabilities of these units of government also must be provided.

Fragmentation of functions among administrative agencies and an apparently low level of citizen concern severely restrict the effectiveness of many state solid waste management agencies. The levels of interagency coordination that can develop within state government depend upon the strength of legislative directives, administration responsiveness, the strength or weakness of the host department among the hierarchy of state agencies, and the adroitness of the solid waste management program director. Legislative action can combine some regulatory functions into a single agency and place emphasis upon the need for close coordination among other agencies. However, neither legislative nor administrative action will be undertaken unless a strong mandate for action is given by the State's citizens or by the federal government.

8. Solid Waste Management: Financing Services

Financing improved solid waste services by local governments appears to be one of the most significant problems to be faced by local and state governments during the current decade. The Environmental Protection Agency estimates that 60 percent of all costs to implement environmental controls during the next five years will be spent on solid waste collection and disposal.[19]

The Task Force recognized that many options exist for financing solid waste services. The practical consideration of these options varies from State to State. The practicality of using one or more alternatives for financing improved services, regulatory programs, or the various forms of assistance programs varies according to the constitutional limitations and state laws affecting the authority of state administrations and local governments – these vary between state subdivisions and municipal corporations in most States – and practical limitations determined by the interests and desires of the populations served by these governments. While these numerous variables make the financing of solid waste services an extremely complex matter in every State, financing a state solid waste service or other programs can be undertaken in manners similar to those used to finance any other state program.

GENERAL PROBLEMS

Providing adequate solid waste collection and disposal services is a high-cost obligation of local governments. The more than 20,000 municipal corporations and over 3,000 counties represent, in most States, the local governments which are normally obligated to provide solid waste collection and disposal services for inhabitants of their jurisdictions (see "Size Limitations," page 11). The level and quality of services presently provided and the inability to improve these services primarily rest with the administrative and fiscal capabilities of these governments.

Improved solid waste services under stricter state regulations require increased capital expenditures and higher operational costs than has been typical in most communities. Many local governments are already operating under extreme fiscal limitations and are unwilling or unable to expand their collection services and close their dumps in favor of higher cost operational practices. Most small local governments have great difficulty obtaining the revenues necessary to provide adequate urban services. Very few have the means to obtain financing for improving existing services, to sustain improved services, and to obtain managerial and technical capabilities essential to develop and maintain such services.

Solutions to solid waste service financing needs are related to other local government requirements and cannot be considered in isolation from them. In many areas, the complexity of interrelated problems faced by local governments symptomatically appear as financing difficulties. These interrelated problems have so debilitated some local governments that drastic state efforts will be necessary to relieve the plight of residents within these areas.

Local governments are the creatures of the States; the effectiveness or ineffectiveness of these governments are the responsibilities of the States, and solutions to the long-accumulating financial problems of local governments can be effectively rendered only by the States. These solutions go far beyond the treatment of the symptoms through federal and state revenue sharing with local governments.

Typical of many local governments are: decaying central cities in major metropolitan areas; fragmented metropolitan areas with numerous large and small jurisdictions (see Chapter 4); declining rural activities in many parts of the country with corresponding declines in populations and the abilities of local governments to remain viable; and state subdivisions oriented towards 19th century governmental requirements. All of these trends indicate the limitations of existing local governments and a need for state action to bring about local government modernization, including consolidation.

As a result of the growing welfare service demands being placed upon local governments, including improved solid waste collection and disposal services, a number of general problem areas have become apparent. These local government limitations may either directly or indirectly affect a local government's ability to adequately finance improved solid waste services. These limitations include:

1. Administrative mechanisms that are not adequate to meet modern urban needs including: lay administration without professional support; inadequate accounting systems; and ineffective audits;
2. The inability to coordinate various urban service programs due to the lack of staffs, facilities, and equipment;
3. Lack of citizen awareness of their responsibilities and the capabilities of their local governments;
4. Restricted jurisdictional areas without the ability to adjust boundaries to meet particular urban service requirements;
5. State restrictions placed upon local governmental authorities;

6. Too many local governments and special districts vying for the same revenue sources.

Financing improved services is also limited by local governments' failure to maintain accounting systems that permit the determination of all costs associated with the provision of solid waste collection and disposal services. As a result, many local governments inadvertently underestimate the actual costs of providing existing services. The following list illustrates costs not normally attributed by local governments to their solid waste collection or disposal services.[20]

1. Administrative office and equipment costs when located with or used by other governmental units.

2. Operations equipment, facilities or labor costs when used partially by other governmental units.

3. Administrative and managerial labor costs when a single manager functions in more than one capacity or for more than one department.

4. Property taxes lost when public land is used for a municipal function.

5. Allocation of tax or service fee collection costs related to that portion of the budget taken up by the collection and disposal operations.

6. Allocation of personnel and property insurance costs.

7. Cost of utilities if some are municipally provided.

8. Cost of facility and equipment depreciation.

9. Cost of facility and equipment repairs, primarily the costs of major renovations or overhauls.

10. Financing costs, especially interest and other financing service charges.

One of the severest limitations of local government that grossly affects the viability of solid waste service systems is directly related to restrictive local land-use practices. Many local governments are faced with the inability to find nearby disposal sites. This inability forces such governments to consider using high-cost waste-processing facilities to reduce volume and haul the waste to distant locations. Both the processing facility and haul distance add greatly to the financing needs and operational costs of a collection system and force residents of a community to pay higher per capita financing and operating costs than are necessary. The insistence upon "going it alone" also reduces the small government's ability to obtain competent managerial talent and proper operational equipment. As a result, the disposal site is operated as little more than a dump, and this reduces the possibility of using the site for some constructive purpose in the near future. This is an opportunity loss, and it also reduces the market value of the disposal site and surrounding land. Finally, small governments cannot select sites in the context of developing land for future public uses 10 to 15 years ahead of the local growth trends. With the competent planning agencies available to larger political jurisdictions, disposal sites can be selected, designed, and operated according to some future planned use for the site. The inability to consider multipurpose land-use planning techniques with a community welfare orientation, and the resultant lost opportunities, are most pronounced in our metropolitan areas where the need is the greatest.

FINANCING ALTERNATIVES

Financing alternatives available for improving solid waste services vary widely among local governments. They vary according to the constitution and the statutes of each State. Most State Legislatures have placed restrictions upon local governments regarding their taxing powers, their use of funds, and the means that can be used to obtain funds. Very few State Legislatures have initiated broad financial assistance programs to aid local governments, although many do grant earmarked funds for specific uses.

Possible financing alternatives vary according to the local governments' sizes, population densities, income levels of inhabitants, and interests of inhabitants. Local governments typically choose to provide differing levels and types of services, and inhabitants often demand different types of services. All of these factors affect the possible financing alternatives for providing solid waste collection and disposal services.

Among the various financing alternatives possible, the selected methods in a particular situation will depend heavily upon other types and levels of existing local government obligations. An evaluation of these financing alternatives requires specialized legal, administrative, and financial capabilities often not available in small municipalities.

Competent local government administrators are fully aware of the range of textbook alternatives available, but all have one common problem. The problem of finding a workable arrangement for a specific municipality or a cooperative arrangement for a group of local governments can become complex and difficult if undertaken. The complexity of restrictive law in each State applicable to local government authority and the numerous characteristics of the participating local governments that must be considered require ingenuity among those who must assemble the financing package to make the design of a project workable.

The more local governments that must participate, the more complex the financing arrangements become. As financing arrangements become more complex, the ability of local governmental officials and the general public to judge the project's relative benefits diminishes. As understandings diminish, suspicions rise, and if each party to the project does not feel that his jurisdiction is receiving the greater benefit, the cooperative arrangement between the governments becomes difficult to achieve.

Both the problems of raising essential capital within small municipalities and the extreme difficulty of developing interlocal government financing arrangements restrict the possibilities of providing improved services. State governments must be willing to provide adequate initial capital for projects and provide the forms of technical assistance necessary to encourage cooperative arrangements

among local governments. In some cases, this may entail broadened and more flexible authority for some central cities and some counties. In other cases, this may entail state legislative mandates to local governments to coordinate rather than compete with other governmental units. In still other cases, the provision of effective services may require direct state government assistance – both financial and operational. This latter alternative should not be excluded as a possible necessary state action.

Many solid waste service districts, even with interlocal government coordination, will still be small and will require financing that cannot be made attractive to private lending or bonding institutions. The States, in participation with the federal government, must evolve loan or insurance mechanisms that will allow local governments to more easily obtain needed capital for urban service type projects. One such mechanism discussed by the Task Force that should be investigated is a Federal National Insurance Mortgage Agency type apparatus that could be used to stimulate investments in solid waste services and other urban service projects.

The financing needs of local governments are extremely complex and cannot be solved by another earmarked fund or by an expanded revenue sharing program without other complementary actions. At the same time, most local governments cannot continue to sustain their needs through existing financing mechanisms. The dependence upon property taxes or user-fees for supporting solid waste services must be reevaluated in perspective with other problems of local government.

Massive infusions of federal and state funds cannot solve the financing problems of most local governments. Their financing difficulties are only symptomatic of more fundamental problems. However, funds directed towards the modernization of local governments and the development of state capabilities to direct this badly needed modernization can gradually bring about essential improvements.

Property Taxes

While the bulk of our Nation's population is concentrated within metropolitan areas, these areas are comprised of a myriad of overlapping small governments. When all special taxing districts are considered, our Nation becomes a puzzle of more than 80,000 small political units with differing purposes, powers, and fiscal capabilities. Most of these units depend almost exclusively upon a single source of revenue – the property tax. This tax base provides about 90 percent of all county government revenues and about 70 percent of the revenue available to municipalities.[21] As a result, most of the funds for solid waste services must be obtained in competition with other needs of local governments.

Numerous practices have eroded the effectiveness of the property tax. The major problems associated with local government dependence upon this source of revenue include:

1. Dependence upon elected tax assessors which almost precludes objective professional assessment;

2. The small size of most political units prevents the tax assessor from obtaining and maintaining professional staff;

3. Fractional assessments and overassessments prevail in spite of state laws requiring uniform assessment. Most States make little effort to bring about uniformity;

4. Numerous state laws impose class exemptions based upon ownership or use upon the property local governments may tax, and additional spot and class exemptions are granted by local units;

5. Many municipalities have below-average family incomes with corresponding anemic tax bases, or they have high expenditures due to concentrations of low-income families;

6. In many municipalities, the value of property and the expansion of higher-valued properties are not growing as fast as the demand for revenues;

7. State-imposed tax rate limits and debt limits in relation to property assessments also restrict use of the property tax as a source of local government revenue and borrowing power.

User Fees

The second major source of revenue used for support of solid waste services includes various forms of user fees. These fees may be levied on the recipient of a collection service, the user of a disposal site, or both. They may be levied as flat rates by class of user or according to some direct use of service formula. Besides more complex accounting requirements, the major problems associated with the use of such fees relate to the ability and willingness of the general public to accept the concept.

In many urban areas, solid waste service recipients are willing to pay a fee for collection services. In levying user fees, either the services are provided to all users of the services in the political unit or to selected parts of the jurisdiction. Many local governments do not provide collection services to all residents, commercial facilities, or manufacturing industries within their jurisdictions. Therefore, some will have to haul their solid waste to disposal sites. Instead of paying the disposal site fee, some residents create promiscuous dumps or use available roadside litter containers while many business establishments and manufacturing industries open dump on their property. At times, residents of one jurisdiction will even travel to another jurisdiction and promiscuously open dump their solid waste rather than pay the disposal site fee.

Private companies performing a variety of services often oppose fees levied at the disposal sites. Service industries such as household movers, home repair services, and lawn and yard services, normally are forced to: charge more for their services; refuse to remove the waste and allow the service user to directly bear the waste disposal cost; or dispose of the waste at some promiscuous site. The first alternative will be the one most often accepted, but it

represents a departure from past practices at an increased cost to the service industry. Formerly, the cost of disposal had been accepted by the operators of the disposal site; now the costs are transferred to the users of the site.

In rural areas and among a number of urban area residents, usually those with rural backgrounds, service fees for the collection and disposal of solid waste are less accepted. Where the practice of open promiscuous dumping has been widely practiced, acceptability of any form of charge for waste collection and disposal will be resisted by segments of the population. Only residents living near existing open dumps will be relieved and, in principle, will accept fees for the collection and disposal services.

In these areas, the process of winning public acceptance requires a long and patient effort coupled with a persistent enforcement program by those desiring or imposing the services.

In rural areas and the majority of municipalities, the acceptable levels of user fees would only help defray a part of the costs for adequately improved solid waste services directly provided by the government. Basic capital and operating costs for solid waste collection and disposal by single small jurisdictions require too high a per capita or per-unit charge and other supplemental funds would be necessary. In these cases, substantial supplemental assistance from the State probably will be necessary to defray both the costs of gaining public acceptance and the costs of providing the service.

9. Solid Waste Management: State Legislation

The Task Force reviewed materials or discussed aspects of legislation and resulting programs from 10 States. These included: Alabama, California, Illinois, Kentucky, Maine, Maryland, Massachusetts, Minnesota, New Jersey, New York, Ohio, Pennsylvania, Tennessee, Vermont, Washington and Wisconsin.

This legislation may have reflected a state solid waste management act which gave emphasis to the regulation functions of an agency. In many cases, the legislation was oriented towards the structure of an administrative agency such as Washington's Department of Ecology or Illinois' Environmental Protection Act. In both the Illinois act and California's recent legislation, as examples, the solid waste management-related functions of several state agencies are described in the legislation. Maryland, as another example of diversity, has created the Maryland Environmental Service — an agency that is to focus upon waste management as contrasted with a strictly regulatory approach to waste collection and disposal.

The Task Force also recognized the direct relationship between land-use planning and state-level solid waste management. Vermont, Maine, and now Florida have passed land-use planning legislation, but none of these States expressly related solid waste management problems to the land-use planning process.

State legislation related to solid waste management problems is changing rapidly. Undoubtedly, some legislation has been passed by States that should be reviewed nationally. Unfortunately, the continual appraisal of changing state legislation is a costly and time-consuming activity. As a result, evaluations of the similar and contrasting character of state legislation regarding solid waste management are not available.

Similarly, within each State numerous legislative acts have been passed over the years which influence state solid waste management practices. In those States where environmental legislation has been codified, the task of assembling pertinent legislative acts relating to state solid waste management functions is more easily accomplished; very few States have codified their environmental laws.

Normally, this legislation can be grouped according to state regulation functions and according to permissive or authorizing legislation which gives authority to local governments or others to perform or have performed selected forms of solid waste collection and disposal activities. Finally, the intent of state efforts relating to solid waste management functions often appears in rules or administrative regulations of the legislatively authorized state agencies. These rules or regulations essentially set forth the actual or practical solid waste management functions of the State. Review of these materials will determine the real intent or effectiveness of state programs. However, in some States the legislation is so specific that the state law takes on meanings corresponding to the rules or regulations developed by solid waste management agencies of other States.

EXAMPLE LAWS OR AUTHORITIES

The following materials illustrate some of the later trends in state legislation affecting solid waste management. The use of this material does not necessarily constitute acceptance by the Task Force of concepts or formats presented. Instead, the material is included to illustrate selected legislative options developed by four States. It should be expected that no two States will adopt identical administrative structures nor will the solid waste management authority of any two States be the same.

CALIFORNIA[22]

Institutional Structure

Under the recently passed legislation, solid waste management activities essentially function within the State Resources Agency. This is one of the four superagencies created within the past few years. The 1972 legislation (Senate Bill No. 5) essentially recognizes these public bodies concerned with solid waste management (one is temporary). These include:

1. The Solid Waste Management Board comprised of seven appointed members (Art. 4, Sec. 66740).

2. The State Solid Waste Management and Resource Recovery Advisory Council with 25 appointed members and administratively placed within the Board.

3. The State Department of Health.

California has had a variety of state agencies that performed various functions related to solid waste management. Under Art. 3, Sec. 66732, para. d, these agencies, and especially the State Water Resources Control Board, apparently retain their previous administrative or enforcement functions.

Agencies' Functions

1. Under Art. 1, Sec. 66770, the Board shall formulate and adopt state policy for solid waste management, including minimum standards for solid waste handling and disposal *for the protection of air, water, and land from*

pollution. (California uses a different interpretation of the terms "pollution" and "contamination" from those included in the Task Force Discussion Materials.)

2. The Board shall

a. (Art. 2, Sec. 66733) prepare guidelines for solid waste management plans (guidelines can be considered as standards that lack the legal implications of standards).

b. (Art. 2, Sec. 66733) provide technical assistance in the preparation, revision, and implementation of solid waste management plans.

c. [Art. 4, Sec. 66790, para. (a)] conduct studies and investigations regarding new or improved methods of solid waste handling, disposal or reclamation, and review and coordinate solid waste management studies by other state agencies.

d. [Art. 4, Sec. 66790, para. (b)] prepare and implement a statewide solid waste management information storage and retrieval system coordinated with other state information systems.

e. [Art. 4, Sec. 66790, para. (c)] implement a public information program to provide information to local government, private industry, and general maximum environmental protection, and effective reuse of waste products.

f. [Art. 4, Sec. 66790, para. (d)] render technical assistance to state and local agencies, local health officers, and others in the planning and operation of solid waste programs.

g. [Art. 4, Sec. 66790, para. (e)] study the nature, extent, and methods of reducing and controlling the litter problem statewide, and report its conclusions and recommendations to the Governor and Legislature not later than January 1, 1975.

h. (Art. 4, Sec. 66791) adopt by January 1, 1975 . . . the State Solid Waste Resource Recovery Program (see Sec. 66735).

3. The State Solid Waste Management and Resource Recovery Advisory Council shall:

a. [Art. 5, Sec. 66751, para. (a)] prepare and recommend to the Board, by July 1, 1974, the State Solid Waste Resource Recovery Program. The program shall include (Art. 3, Sec. 66735)

(1) Guidelines, criteria, procedures and financial participation formulas for the initiation and maintenance of a major state-directed research and development program, with public and private entities to develop technologically and economically feasible systems for:

(a) collection, reduction, separation, recovery, conversion and recycling of solid wastes;

(b) environmentally safe disposal of nonusable residues.

The program may include:

(a) pure research;

(b) design, construction, and testing of pilot equipment and systems for processing solid wastes.

(2) Special studies and demonstration projects on the recovery of useful energy and resources from solid wastes, including, but not limited to, the following:

(a) Methods of recovering resources and energy from solid wastes, recommended uses of such resources and energy for the local, state, national, or international welfare, including identification of potential markets for such recovered resources, and the impact of the distribution of such resources on existing markets.

(b) Changes in current product characteristics, and production and packaging practices, which would reduce the amount of solid waste generated at its source.

(c) Methods of collection, reduction, separation, and containerization which will encourage the more efficient utilization of facilities and contribute to more effective programs for the reuse of solid wastes.

(d) The use of state procurement to develop market demand for recovered resources, with special emphasis on maximum possible state use of recycled paper.

(e) Recommended incentives, including state grants, loans, and other assistance, and disincentives, to public agencies and private organizations and individuals, necessary to accelerate the reclamation and recycling of resources from solid wastes.

(f) The effects of existing public policies, including subsidies and economic incentives and disincentives, percentage depletion allowances, capital gains treatment, and other tax incentives and disincentives, upon the recycling and reuse of solid wastes, and the likely effects of the modification or elimination of such incentives and disincentives upon the reuse, recycling, and conservation of such resources.

(g) The advantages and disadvantages, and methods of imposing disposal taxes on packaging, containers, vehicles, and other manufactured goods, which charges would reflect the cost of final disposal, the value of recoverable components of the item, and any social costs associated with the nonrecycling or uncontrolled disposal of such items.

(3) State pilot resource recovery projects, at the state institutions where such projects are deemed most feasible, to:

(a) Provide advice and assistance to the Board in the development of state policy for solid waste management.

(b) Review and recommend to the Board revisions in the resource recovery program.

(c) Make recommendations to the Board concerning each local solid waste management plan submitted.

(d) Provide advice and assistance to citizen-action groups, solid waste producing industries, and public and private solid waste collection and disposal organizations on the development and implementation of solid waste recycling and resource recovery programs.

(e) Provide advice and assistance to the Board in connection with the study by the Board of the nature, extent, and methods of reducing and controlling the litter problem statewide.

Note: (Sec. 66753) the existence of the Council shall terminate on July 1, 1976.

4. The State Department of Health shall

a. Continue to administer and enforce such laws . . . *as they relate to human health* (see Sec. 4510), which are within its jurisdiction as they apply to solid wastes.

b. Evaluate and study, as appropriate, the characteristics of solid wastes and methods for their handling and disposal for health protection.

c. Render technical assistance to the Board, local agencies, and others in the planning and operation of solid waste management programs and resources recovery programs.

d. Formulate technical criteria and suggested guidelines for use by state and local agencies in development, planning, implementation, and operation of programs for the local handling of solid waste.

e. Stimulate and participate in research and development projects conducted by other public or private agencies, especially those intended to reduce, effectively reuse, or decontaminate waste products.

While the Board is the single designated agency for solid waste management with respect to the federal government requirements (Sec. 6679) and functions as an umbrella agency, the powers of established agencies (excepting the State Health Department) appear to be retained.

The Department of Health is responsible for all aspects of solid waste management and resource recovery as they *directly* affect human health (Sec. 4510). Interestingly, the Department of Health also functions as the occupational health agency with respect to solid waste management. Therefore, coordination must be established with both the Federal Solid Waste Program in EPA and with the Occupational Health Program in HEW. In the past, federal agencies with different congressional authorities required state programs to maintain clear and distinct accounting structures when federal funds were used. This prevented state agencies from developing coordinated programs and effective exchanges of technology and manpower.

Local Government Functions

Art. 3, Sec. 66730, establishes that "the primary responsibility for adequate solid waste management and planning shall rest with local government."

Sec. 66732 retains within local governments:

1. The power of a city, county, city and county, or district to adopt and enforce regulations, not in conflict therewith, imposing conditions, restrictions, or limitations with respect to the handling or disposal of solid wastes.

2. The power of any city, county, city and county, or district to declare, prohibit, and abate nuisances.

Art. 2, Sec. 66780, requires the preparation of a countywide comprehensive, coordinated solid waste management plan (includes other regional plans) for:

1. All waste disposed within the county.

2. All waste originating therein which is to be disposed of outside the county.

Final Comments

Perhaps the most significant part of this law, for purposes of the Task Force, is the delineation of the Advisory Council's functions (the Solid Waste Resource Recovery Program). The problems or tasks outlined are extremely complex but essential for a statewide policy regarding a resource recovery program. To accomplish the requirements stated in this legislation by July 1, 1976, will require a large-scale, concerted study effort.

ILLINOIS[23]

Institutional Structure

The Illinois Environmental Protection Act of 1970 established three public bodies concerned with solid waste management.

1. Under Title 1, Sec. 5a, an independent Pollution Control Board is created.

2. Under Title 1, Sec. 4a, an Environmental Protection Agency under the executive branch of state government is created.

3. Under Title 1, Sec. 6, the Illinois Institute for Environmental Quality within the executive branch of state government is created.

Board and Agencies' Functions

Sec. 5b describes the functions of the Pollution Control Board. The Board shall:

1. Determine, define, and implement the environmental control standards.

2. Have the authority to act for the State in regard to the adoption of standards for submission to the United States under any federal law respecting environmental protection.

3. Have the authority to conduct hearings upon complaints charging violations of this act.

Section 4b-4m describes the functions of the Environmental Protection Agency. The Agency shall:

1. Have the duty to collect and disseminate information.

2. Acquire technical data.

3. Conduct experiments.

4. Ascertain the quality and nature of discharge from any contaminant source.

5. Operate and arrange for the operation of devices for the monitoring of environmental quality.

6. Have the authority to conduct a program of continuing surveillance and of periodic inspections.

7. Have the authority to enter at all reasonable times upon any private or public property for the purpose of inspecting and investigating to ascertain possible violations.

8. Have the duty to investigate violations . . . present enforcement cases before the Board, and to take summary enforcement action.

9. Appear before the Board in any hearing upon a petition.

10. Have the authority to appear before the Board in any hearing.

11. Have the duty to administer permit and certification systems.

12. Have the authority to require the submission of complete plans and specifications from any applicant for a permit.

13. Require the submission of such reports regarding actual or potential violations.

14. Have the authority to make recommendations to the Board for adoption of regulations.

15. Have the duty to represent the State of Illinois in any and all matters pertaining to plans, procedures, or negotiations for interstate compacts or other governmental arrangements relating to environmental protection.

16. Have the authority to accept, receive, and administer on behalf of the State any grants, gifts, loans, or other funds made available to the State from any source for purposes of this act.

17. (may) prescribe reasonable fees for permits.

18. (is authorized to) promulgate regulations and enter into contracts.

Section 6 describes the duties of the Institute for Environmental Quality. The Institute shall:

1. Investigate practical problems and implement studies and programs relating to the technology and administration of environmental protection.

2. Obtain, store and process relevant data.

3. Recommend technological, administrative, and legislative changes and developments respecting:

a. Environmental quality;

b. Recycling;

c. Reuse;

d. Conservation of natural resources and solid waste.

4. Cooperate with:

a. The Board.

b. The Illinois State Geological Survey.

c. The Illinois State Natural History Survey.

d. The Illinois State Water Survey.

e. Other federal or state research agencies, facilities, or institutions in the selection of projects for study.

f. The Board of Higher Education and with the public and private colleges and universities in this State in developing interdisciplinary approaches to the problems of environment.

5. Evaluate curricula at all levels of education and provide assistance to instructors.

6. Sponsor an annual conference of leaders in government, industry, health and education to evaluate the progress or lack of progress in achieving environmental quality.

7. Establish within the Institute a Solid Waste Management Task Force:

a. To make surveys and recommendations regarding the development of regional systems of solid waste and refuse collection, handling and disposal.

b. For coordinating municipal and industrial solid waste disposal programs.

c. To expedite development of systems for recycling and reuse of refuse and solid waste materials.

d. To make periodic reports and recommendations for submission to the Board.

Note: Sec. 7(b) neither the Agency, the Board, nor the Institute shall charge any fee for the performance of its respective duties under this act.

Local Government Functions

Local government functions are not specifically addressed in this legislation. Instead, local governments are defined as "persons" and essentially must respond in a manner similar to all other persons. Apparently, local governments do not have a regulatory function.

Title XIII, Sec. 4b, establishes that operational requirements in municipalities or sanitary districts can be dictated by the Board. This section further establishes that all costs for facilities or modified practices shall be paid for or obtained by these governments.

Final Comments

Citizen Participation

Under Title VII: Regulations, Sec. 28 and Title VIII: Enforcement, Sec. 31(b), the legislation makes provisions for citizen participation in:

1. Adoption, amendment, or repeal of the Board's regulation.

2. The issuance of complaints and the initiation of violation investigations.

State Agency Compliance with Act

Under Title VIII, Miscellaneous Provision, Sec. 47(a), "The State of Illinois and all its agencies, institutions, offices and subdivisions shall comply with all requirements, prohibitions, and other provisions of the Act."

Environmental Impacts

Under Title XIII, Sec. 47(b), "Each State agency or institution shall annually assess the environmental problems created by its operation . . . "

Repeal of Existing Legislation

Under Title XIII, Sec. 50, the act repeals previous state solid waste management legislation. However, no mention is made of other solid waste management problem areas such as agricultural wastes and mining wastes.

MARYLAND WASTE MANAGEMENT AGENCY[24]

The Maryland Environmental Service (MES) created in 1970 gave the State of Maryland a new function which had been left exclusively to local governments — the actual construction and operation of solid and liquid waste

treatment and disposal facilities.

MES is a public corporation, housed within the Department of Natural Resources, which acts like a "state-wide sanitary district," to institute a management rather than a regulatory approach to environmental quality. While the New York Environmental Facilities Corporation and the Ohio Water Development Authority have similar authority to construct and operate waste treatment and disposal facilities, only Maryland has specific authority and funds to draft and implement solid and liquid waste facilities plans, in order to institute regional approaches to waste management.

MES can assume its waste control function in three ways: (1) Through implementation of the five-year regional plans for solid and liquid wastes, which are drafted by the Service and outline a mutually agreed upon division of services between state and local governments; (2) When a local government or industry requests aid, MES must provide the desired facilities or services; (3) If an industry or municipality violates a compliance order to conform to water quality standards or regulations governing solid waste disposal, the Secretary of Natural Resources or the Secretary of Health and Mental Hygene can direct the Service to take over the violator's waste treatment and disposal facilities until compliance is achieved. In these ways the Service becomes both a regional service institution and a weapon in the State's arsenal to gain compliance with water quality goals and solid waste disposal regulations.

As with Vermont's and Maine's entrance into the land-use control field, Maryland's initiation of waste treatment and disposal work does not take all such responsibilities away from local government. In fact, in all three of these situations, the State seeks a partnership arrangement with local government. The idea is that the State will be able to do regional planning and institute regional approaches to the treatment and disposal of liquid and solid wastes. The State will be able to use management techniques and large-size facilities, which are not available to local governments because of their smaller size and more limited geographical perspective, thus saving money and increasing pollution abatement. The State is also expected to secure better financing of construction and operations. But, it is not yet clear that local governments want this help. At least during the legislative creation of MES, the benefits were not apparent to local officials, who were the principal and vigorous opponents of the Service. Fearing loss of local autonomy in the waste management field, they persuaded the General Assembly to amend the original proposal to provide a local veto over location of facilities and regional waste management plans. Consequently, the Service must be able to persuade local governments of their usefulness, before regional management systems can be implemented.

MICHIGAN STATE COURTS AND THE CITIZEN SUIT[25]

The Michigan Environmental Protection Act gives every public or private entity the right to sue any other public or private entity in state courts to protect the environment and the "public trust" therein. This mechanism of class action lawsuits by private citizens to forestall environmental damage is under consideration now in at least 29 State Legislatures and the United States Congress.

The Michigan law, known as the "Sax" bill for Joseph Sax, professor of law at the University of Michigan and drafter of the original proposal, has three key features:

(1) The act's focus is on the "third branch" of government, drawing the State's judicial institutions more actively into the field of environmental control. By assuring every citizen standing to sue, regardless of whether a particular environmental standard is violated, it is hoped that the courts will serve as a check on public agencies and private polluters. Michigan did not follow the traditional method of improving pollution control which is to give a state executive agency new authority or a new structure to reform its operations. Rather, the courts are used in Michigan to remedy what were considered there to be problems inherent in the administrative system. Administrative agencies were thought to be slow in responding to pollution crises, and limited to act only on those problems specifically anticipated by the State Legislature in the form of legislation. Furthermore, some state bureaucrats were thought to be sympathetic to the polluters they regulate. By contrast, the drafters of the Michigan law expected the courts to be swift, tough, and impartial in abating all types of anticipated and unforeseen environmental problems. They designed a role for the courts that they thought would "patch the holes" in the administrative framework established by the Legislature and act as a check on arbitrary or inadequate administrative action.

In order to perform in these ways the courts are given very wide latitude by the Michigan Legislature. Judges can determine the "validity, applicability and reasonableness" of a standard set by an administrative agency. These terms are not defined in the statute. There is no need to show that the existing standards are "arbitrary, capricious or unreasonable," as is usually the case when the court examines an administrative standard.

Furthermore, if the court decides that a standard does not meet these very general criteria, it may direct the administrative agency to adopt a new standard, which the court specifies.

Indeed, the 1970 Michigan act overturns the entire traditional process by which courts review actions of administrative agencies. In no way are the Michigan courts constrained by the administrative proceedings that preceded an environmental lawsuit. Courts are not legally bound by the findings of fact or the conclusions of law in the administrative proceedings. Court proceedings are "de novo" if the judges choose to make them so.

Finally, it is up to the courts to decide if the polluter charged in a lawsuit had any "feasible and prudent alternative" to his action, for if he had none, this is adequate defense.

(2) The role of the private citizen in environmental

protection is increased by a broad grant of standing to sue as a member of the public rather than as an individual who has suffered harm peculiar to him. Right to intervene in all types of administrative licensing or other proceedings is also granted. Through administrative and judicial mechanisms, the private citizen is intended to become a check on any arbitrary administrative action, and substitute for an agency's non-action by suing private polluters. If the agency fails to act effectively, if pollution is unabated, the citizen can seek his own remedy in court.

(3) Finally, the act employs the "public trust" doctrine. According to this doctrine, the government possesses the State's natural resources in trust for the proper use and enjoyment of the citizenry. This fiduciary obligation, when abused, can be enforced in the courts by a private citizen who sues in his role as a member of the beneficiary class – the public.

Part II
Conclusions and Recommendations

Introduction

The following three chapters of this report represent the findings of the Task Force. These materials outline the essential elements of the States' roles, the federal government's role, and government's contribution to an expanded resource recovery effort.

Included in these findings are some of the policy-level options to be considered by state government and the Task Force's consensus conclusions of actions to be taken. Review of these materials will illustrate the need for substantive intergovernmental coordination if effective solutions to solid waste management problems are to be resolved. The three chapters together illustrate the magnitude of the effort required. Finally, the inclusion of resource recovery concepts in this part of the report illustrates the degree to which governments must depend upon our Nation's economic system if ultimate solutions to solid waste management problems are to be developed.

10. State Government Functions

This chapter represents the Task Force's consensus views on the roles of the States in solid waste management based upon findings presented in Part I. The recommendations presented here are the Task Force's considerations of the various policy-level options that should be considered in a state solid waste management program. The Task Force considered that its function was to identify the objectives of the States' roles and not the detailed procedures for accomplishing these functions. The process for reaching these objectives will vary substantially from State to State. Groups within each State must develop the procedures suitable for their citizens' needs in accordance with their constitutions, bodies of law, and institutions.

Within many States, solid waste management programs are focused primarily upon one or more of the following areas:

1. Regulation of solid waste disposal sites.
2. Solid waste management planning.
3. Some form of technical assistance.

These three major areas of concern represent the federal government's interest of recent years. Many States developed programs in response to the availability of federal funds and structured their activities in areas acceptable to the federal concepts. As a result, numerous state programs reflect recent federal views toward solid waste management.

The Task Force was concerned with understanding the solid waste management requirements of state government that reflect state needs. Therefore, Part I of this report was developed as a means of understanding the broad range of problems affecting the delivery of improved solid waste services to inhabitants of the States. From this perspective, the requirements of a state program could be seen more clearly and conceptual organizational objectives could be determined.

OPTIONS OF GOVERNMENT

The following options have to be categorized according to the most probable governmental level that would perform the function. This may take the form of a matrix, especially when it looks as if more than one government would perform the activities. In addition, it will be necessary to identify probable agencies of government with responsibilities for functions in these areas.

1. The state government may provide services to local governments and private enterprise in the development of improved solid waste systems.

2. The state government may provide special educational services to local governments and private enterprises involved in solid waste service delivery. This may be performed by educational institutions supported by state or local governments.

3. State government may conduct research in solid waste management (delivery system and environmental) problems and make its findings available to local governments and private enterprise.

4. State government officials and agencies may give advice and information to local governments or private enterprise developers and operators of solid waste delivery systems.

5. State government may regulate the development and operation of solid waste delivery systems as means of protecting the public health and local environments. This usually takes the form of construction and operational permits and then some form of operations inspection system.

6. State government may utilize its control capabilities to subsidize the development of regional systems. It can provide direct administrative, managerial, technical, and financial assistance; it can provide financial incentives through direct financial grants or tax concessions to encourage interlocal government coordination; it can retain its power of direct intervention to assure that public health and environmental protection measures are developed and maintained.

7. Both solid waste delivery systems and their regulation may be supported through intergovernmental fiscal transfers. The federal government may provide funds to the States who, in turn, provide funds to the local governments who, then, either provide the actual delivery service or support, through one of several means, for provision of the required services.

8. Local governments may regulate solid waste services according to: types desired, quality provided, frequency of service, and acceptable costs as determined by their particular requirements.

9. Local governments normally attempt to support their activities related to solid waste through a tax or fee system. Either of these may be designed to produce revenue or to provide an incentive to improve services or to control or regulate the delivery systems in accordance with their particular requirements.

10. Local governments may utilize their control capabilities to subsidize the development of private delivery systems. They can provide tax concessions to private enterprises willing to provide some level of solid waste

service. They also can allow the establishment of a monopoly (franchise) within their jurisdictions.

11. Local governments may contract directly with private enterprise on terms preferential to the supplier of a desired solid waste delivery system (cost-plus contracts). These are used where the technology is not well known or where undeterminable hazards are suspected.

12. Local governments may enter into a partnership arrangement with other governments or private enterprise where each performs a part of the required services.

13. Local governments may participate with other local governments or private enterprise in the administration of the required solid waste delivery service.

14. State or local governments may own and operate the solid waste delivery service outright.

STATE GOVERNMENT POLICY OBJECTIVES

As a result of its deliberative process, the Task Force developed the following recommendations reflecting state concerns. From these recommendations, a perspective of the scope of a program for state-level solid waste management emerges.

Local Government Functions

The Task Force recognized that local governments, in both urban and rural areas, should be responsible for providing or providing for adequate levels and qualities of solid waste collection and disposal services for all inhabitants in their jurisdictions in manners that protect the public health and in manners that are not detrimental to qualities of their local environments.

Local governments should be expected to regulate the performance of solid waste services in accordance with appropriate ordinances in the best interests of the inhabitants and industries within their jurisdictions. These governments should be expected to operate services according to state government regulations, but they should not be expected to function as regulatory and enforcement agencies whose duties are to assure that services provided by operators are adequate and are performed in manners that protect the public health and local environments.

General State Policies

In recognition of the functions of local governments, the Task Force concluded that state governments have the obligation of assuring that local governments can and do provide adequate solid waste services for the inhabitants of their jurisdictions. This includes, *but is not limited to*, the responsibility of regulating practices related to the delivery of solid waste services to assure that they do not become hazardous to the public health and deleterious to local environments.

The state functions regarding solid waste services should include both regulatory and broad-ranging aid functions. In the Task Force's opinion, strong regulatory measures cannot be enforced without first being assured that the capabilities of those being regulated are adequate and permit them to respond in a positive manner to the regulatory measures. A major state effort to develop these capabilities within local governments is necessary.

State programs developed to regulate solid waste services and to aid local governments in the improvement of their services should function with flexible standards and aid programs that reflect regional or local area problems and needs. Legislation and gubernatorial action directed towards this purpose should also include the stipulation of state agency compliance with all established standards.

The Task Force also concluded that restructuring of administrative agencies to unify state solid waste management functions is necessary in many States. However, solid waste management problems impact upon the legitimate functions of numerous other state agencies. Therefore, the Governors of the several States should establish well-defined interagency coordination efforts, and these should be formally recognized through budget allocation of manpower and funds.

A Strengthened Regulatory Role

In recognition that effective regulation of solid waste service practices requires expanded capabilities in the appropriate prosecution and adjudication branches of government, the Task Force concluded that these branches of government must be expanded and improved commensurate with state concern for expanding its regulatory function with regard to these practices and related environmental problems.

Fundamental Information Requirements

As was described in Part I (see Chapter 6 – Solid Waste Management: Operations) of this report, no single agency of government is normally concerned with the determination of the total volume, types, and disposition of solid waste within any given urbanized area. Without such information, the extent of potential public health and environmental hazards cannot be determined. Therefore, the Task Force concluded that preferably from those presently existing, a single agency – State, regional, or local – should be delegated the responsibility to determine the total mix of solid waste being generated within a given local area. In order for a state program to be effective, a complete statewide system of information-gathering agencies will be necessary. The information developed would be useful to other pollution control agencies and would assist local governments in the determination of their interlocal coordination requirements.

Strengthening Local Governments

Recognizing the States' responsibilities for assuring that local governments can provide or provide for improved solid waste services, the Task Force concluded that many local governments will require substantial levels of state assistance in the forms of managerial, technical and financial aid. Adequate mechanisms for the delivery of these forms of assistance by States to local governments are

extremely limited and typically uncoordinated. The States must develop substantive and coordinated aid mechanisms that provide for the needed assistance in manners that assure their maximum effectiveness. These aid programs probably should be developed to assist local governments in modernization efforts to permit them to develop improved solid waste services as integral parts of more general local government service improvement efforts.

The States must develop the capabilities to assist some local governments to accomplish political mergers with adjacent jurisdictions. Other local governments should be encouraged to adopt functional coordination mechanisms for the provision of essential services. In extreme cases in some localities, it may be essential for the state government to directly provide for essential solid waste services.

Because of the difficulties of changing long-established local attitudes, States must also stimulate the needed changes through strengthened or new programs which both encourage and assist local governments to: adopt more flexible land-use policies; develop interlocal governmental coordination for locating disposal sites; adopt improved management practices related to disposal site operation and maintenance; and establish programs to stimulate more enlightened social views towards disposal site requirements and site selection.

Land-Use Policies

The Task Force recognized a strong relationship between current disposal site location problems and local government land-use planning practices. As a result, the Task Force concluded that the States should strongly encourage local governments to reevaluate their current land-use policies and zoning practices to permit more flexible consideration of solid waste facility and disposal site needs. Where local governments are unable to obtain necessary sites for these purposes, the States should consider the use of their prerogatives to assure that adequate sites are made available for the proper functioning of these necessary public services. At the same time, the States should provide assistance to applicable local governments to ensure that state-located disposal sites do not result in public health, environmental or substantive economic damages to nearby local populations and properties.

In those instances where local governments cannot reasonably solve their disposal site problems, the state government should consider using, through due legal process, its power to select and obtain sites for use by inhabitants of these afflicted areas.

Financing Services

The Task Force concluded that local governments, whenever possible, should develop self-sustaining solid waste service systems. At the same time, the Task Force recognized that local governments may need financial assistance to implement improved services. To meet this need, the Task Force concluded that States, perhaps in coordination with the federal government, should develop loan or loan insurance programs to permit local governments or private concerns providing services to local governments to more easily obtain necessary financing for the improvement of solid waste services.

Environmental Impact Statements

Because of the necessity of locating disposal sites in manners that will not be detrimental to the public health and that will not be deleterious to local environments, the Task Force concluded that environmental impact statements should be prepared that objectively identify the physical, social, and economic effects of the use of a site for solid waste disposal purposes. Because local governments generally lack the technical capabilities for performing such evaluations, the Task Force further concluded that the responsibility for the preparation of environmental impact statements should remain as a state agency function.

Legislative Review Capabilities

The adequate evaluation of considerations presented in this report will require substantive legislative review of alternative courses of action. If inappropriate legislation is to be avoided, State Legislatures will require capable full-time research support. With such assistance, Legislatures can be expected to perform effective, in-depth reviews of local governments' needs and abilities to provide adequate solid waste services. Similarly, state legislators then will be able to evaluate state agency capabilities and needs for regulating and assisting local governments to assure that effective services are provided.

Note: The Task Force also recognized that the evaluation capabilities of state administrations similarly need improvement.

ADMINISTRATIVE ORGANIZATION

From the conclusions and recommendations of the Task Force, the general administrative requirements impacting upon the improvement of solid waste services became apparent. Because of the traditional structures of state governments, the full range of state concerns developed by the Task Force would require the coordinated efforts of several state agencies.

Administrative and managerial assistance to local governments is seldom provided by state government on comprehensive and coordinated bases. Various agencies may offer advice and assistance regarding general administration problems, but these are seldom coordinated effectively with the activities of line agencies — in this case, the state solid waste management agency.

Similarly, while solid waste processing facilities and disposal site problems are directly related to land-use policies, a state agency concerned with the resolution of these problems currently does not exist in many state governments. A few States have begun to accept the responsibility for coordinating local land-use planning practices on a meaningful basis, but to date solid waste

management problems normally are not included as state areas of general concern.

The provision of local government administrative and management assistance, land-use planning concerns, and financial assistance would require state government administrative concerns outside the functions of a solid waste management agency. In most States, suitable administrative mechanisms for providing these services must be developed. At the same time, a solid waste management line agency with a primary planning, regulatory, and technical assistance function will have limited effectiveness until these corollary administrative functions are developed. Even when the solid waste management agency functions only as a regulatory agency, it still requires effective support from the prosecution and adjudication branches of government and other pollution control agencies.

A state solid waste management agency probably will function as part of a major state government department. The administrative orientation of this line agency generally is located within a state health department or some form of environmental protection agency. Regardless of the administrative structure selected, a clear recognition of the total scope of activities required to develop an effective state solid waste management program is essential.

In addition to and in conjunction with the recommendations of the Task Force, various state government administrative functions related to solid waste management have been presented in Chapter 9. The elements of the programs developed in California, Illinois, Maryland, and Michigan illustrate a range of options that should be considered by other States. These elements, and the additional concepts developed by this Task Force, should be considered in context with administrative structures acceptable to an interested State.

ENABLING LEGISLATION

As was expressed in Chapters 7 and 9, numerous legislative acts have been passed in each State over the years regarding various aspects of state-level solid waste management. Few States have codified their environmental legislation to permit easy determination of the state body of laws reflecting on the full range of solid waste management authority.

Most state legislation and this report of the Task Force deal with public health and environmental aspects of solid waste management. However, New Jersey has recently passed legislation to consider solid waste services as utilities and, thereby, has approached the question of rate regulation.[26]

Legislation related to state solid waste management requirements essentially should reflect the following areas of need:

1. Regulation authority for state agencies;
2. Research and technology development functions of state agencies;
3. Administrative, managerial, and technical assistance functions of state agencies for assisting local governments;
4. Financial aid and incentive programs for improving the effectiveness of solid waste services provided by or for local governments;
5. Intergovernmental coordination requirements to permit effective development of state agency regulation, research and technology development, and financial assistance and incentive programs;
6. Permissive legislation to allow local governments to develop or provide for more effective solid waste services for their citizens.

Some States have established legislative research or review services. These services provide full-time investigative capabilities for obtaining and developing information critical to appropriate legislative decisions. As state government begins to provide greater levels of service to local governments, the need for establishing or expanding legislative review capabilities will increase.

INTERGOVERNMENTAL COORDINATION

The "State Government Policy Objectives" outlined in this chapter reflect the need for major intergovernmental coordination improvements between state and local governments.

This effort of the Task Force has recognized that solid waste management problems are severe in many areas, and solutions will often require coordinated efforts between governments. While each level of government has an important role to play in controlling solid waste management problems, local governments will have to coordinate efforts with other local governments and the state government. At the same time, state governments must coordinate their management efforts with other States and the federal government.

Because of the broad range of problems associated with solid waste management, no single government – local, State, or federal – has the capacity to develop solutions for all forms of solid waste management problems. Instead, state governments must develop partnership arrangements with local governments and with the federal government in order to control the Nation's growing solid waste management problems.

The Task Force also noted that within governments at all levels, greater degrees of interagency coordination are necessary to develop solutions to solid waste management problems. A solid waste management agency – at any level of government – cannot perform an effective role unless it willingly and deliberately fosters interagency coordination efforts.

Intergovernmental and interagency coordination are both necessary and difficult to achieve. In some cases, Congress and State Legislatures can mandate coordination through law. However, government administrations must perform the actual coordination role and, therefore, the President and State Governors must emphasize the importance of this function within their administrations. Even then, it must be recognized that actual coordination depends upon the mettle of individuals, their personal

interests, and their commitment to genuine improvement in solid waste services.

REGULATION

The Task Force noted that the regulation of solid waste services is an important role of state government; it is not the only role nor necessarily the most important role of a state solid waste management agency. The most important role of state governments is to ensure that fundamental necessities for citizens are provided and are maintained by local governments.

Chapters 7 and 9 illustrate the fragmentation of regulatory authority regarding solid waste management practices. Most state-level solid waste management regulation is concerned with the protection of the public health and the natural environment. The Task Force was primarily concerned with regulation regarding the protection of public health and natural environment and neither advocated nor condemned rate regulations. Apparently, only New Jersey has established state law regarding rate regulation of solid waste services. This latter problem should be the topic of further discussions and investigations.

The Task Force did recognize that the States have the primary role in regulation from a public health and environmental health perspective. Within States, flexible standards must be developed which reflect local needs and conditions. Therefore, it concluded that federal policy towards regulatory standards should be general with specification and engineering standards developed by state governments.

The strong federal policy reflected by the Task Force refers to a general national commitment to improve solid waste management practices; regulation should be only one part of the commitment. At the same time, similar commitments by state and local governments will be necessary if acceptable and workable regulatory policies are to be developed.

Again, effective regulation of solid waste management practices will require improved intergovernmental and improved interagency relations if they are to be effective.

ALTERNATIVE DELIVERY SYSTEMS

The Task Force was concerned with the development of general state government policy objectives. Within the three-month time-frame of its efforts, it chose not to emphasize the mechanics of planning, operations, maintenance, and system accountability. These are topics of urgent concern within States once policy objectives are developed.

Discussions on state-level planning were undertaken. These discussions were limited to the clarification of the general program planning required by a line agency of state government in contrast with program and functional planning for solid waste service areas (see "Solid Waste Management Planning," page 48).

The normal state-level planning functions include:

1. Long-range policy of objectives development planning during which problems are identified and general programs are developed.
2. Short-range, applied, program or administrative planning where program requirements are defined. These would include the required:
   a. Organization.
   b. Legislation.
   c. Personnel.
   d. Financial procedures.
   e. Coordination procedures.
   f. Legislation.
   g. Public education.

FINANCING STATE PROGRAMS

Financing solid waste management programs requires all of the techniques applicable to any government-provided service. A history of alternative state government mechanisms has been developed over the years that, with various modifications, has applicability in many or all States.

The general state methods for assuring that adequate services are provided by local governments include:

1. Shared taxes.
2. Local supplements from state-imposed taxes.
3. Equalization grants.
4. Unconditional grants.
5. Outright assumption of fiscal, program, and functional responsibility.

The Task Force discussed the following general financing options with regard to state assistance for the very small local governments lacking financial bases and management competence for providing improved services (see Chapter 5):

1. State operation of services.
2. State subsidy of services.
3. Combined federal-state subsidy of services.
4. State-directed local government coordination to provide services.
5. State-established, regional solid waste service areas.
6. Relaxed state standards for very small local governments and sparsely populated or rural areas.
7. A low-interest environmental loan fund.

General consensus was developed on the need for some form of loan fund from the States to local governments (option #7). At the same time, the Task Force concluded that options #4 and #5 should be given preferred consideration by state governments.

The Task Force felt that its evaluation could be neither complete nor conclusive. It did recognize that a major national commitment to improve solid waste services with corresponding commitments by the States and local governments would require substantive assistance from the federal government. The directions for such assistance are further outlined in Chapter 11.

11. Federal Program Objectives

GENERAL CONSIDERATIONS

The federal government has played a vital role in developing national concern for solid waste management problems, and an expanded role must be continued through the foreseeable future. In many ways, the federal government must provide a different form of leadership in evolving new concepts and new technology needed to bring about required improvements in local governments' abilities to improve solid waste services within our sociopolitical system. The federal government must set the example for the Nation in the following essential areas identified by the Task Force. These are: a *full partnership* form of intergovernmental coordination with the States; realistically *cooperative* interagency coordination among federal governmental agencies; and by concentrating on obtaining federal agencies' compliance with improved operational practices as examples for others to follow.

The federal government's solid waste management program efforts over the past seven years may be characterized by several general areas of concern to States. The investigation of "black box" technology for controlling solid waste problems has received heavy emphasis, yet, it is still difficult to find workable systems that effectively reduce solid waste in manners that are environmentally safe. A plethora of engineering information has been developed, but little information has been made available on the reliability of more effective reduction systems, their relationship to final solid waste disposal, the problems of materials or energy recovery and, most importantly, valid and complete economic evaluations of such systems. There appears to be a tendency not to release information on projects that are failures, and this practice serves to sustain noneconomic concepts and retard efforts to bring about workable solutions.

Heavy emphasis often was placed upon the use of the sanitary landfill concept with an apparent desire to emphasize such improved practices through strong state regulatory measures. Little consideration seems to have been given to the social, political, and economic realities within local government jurisdictions in each State. The sanitary land-fill concept was promulgated through "Mission 5000" without adequate concern or total engineering requirements, costs, and with a limited knowledge of potential environmental impacts in local areas.

Federal directives called for state solid waste management planning oriented towards regional solid waste service systems encompassing numbers of local government jurisdictions. Little emphasis and guidance was given to state agencies regarding the need for thoroughly understanding existing legal and political constraints in each state government and among local governments, and the development of state plans based upon state agency management functions.

Federal directives also called for a single state solid waste management agency in each State and emphasized the importance of state interagency coordination. At the same time, within the federal government numerous agencies routinely performed functions relating to various solid waste management practices, and virtually no interagency coordination existed among these agencies. Even today, federal agencies function with limited interagency coordination, and federal facilities throughout the Nation operate solid waste services of varying levels and qualities.

The Office of Solid Waste Management Programs (OSWMP) has been reevaluating its position, redefining its goals, and developing a management structure suitable for achieving these goals. However, the development of management capabilities requires personnel trained for management functions. It is a rare engineer who can place his engineering techniques in the background and quickly learn management skills. By placing technically trained personnel in administrative positions without added training, the federal government has inadvertently reduced policy positions to technical positions, and agency directives have reflected technical considerations rather than solutions that recognized broader implications of the problems. This problem is now compounded because of the expanded functions delegated to the 10 federal regions.

If the OSWMP and other EPA agencies are to perform effective services, it would seem that their management personnel should be trained in management techniques for solving problems of government within our social, political, and economic environment. However, adequate institutional training programs oriented towards management skills within government have not yet generally emerged in the United States. Similarly, the problems of state and local governments are essentially unknown to many upper- and middle-management personnel in the federal government. Without such capabilities, federal aid programs to States and local governments will continue to have limited success.

In response to this need, the Task Force concluded that the current reevaluation efforts within the Office of Solid Waste Management Programs should be expanded to include management personnel requirements to more adequately deal with the scope of solid waste management problems, and to adequately develop interagency coordination. An expansion and broadening of personnel capabilities in the regional offices is especially important if the federal government is to effectively assist the States in

continued development of their programs.

A PROGRAM CONCEPT

The Office of Solid Waste Management Programs considers that its primary function should be the protection of the environment. The Task Force applauds this position but also recognizes that meaningful environmental protection will evolve only as rapidly as society recognizes the need. The findings of this Task Force recognize a broad range of interacting factors that affect the ability of political institutions to develop effective means for the protection of the environment. Many of these factors have been outlined in this report, and a federal program to protect the environment will only be successful to the degree that these are recognized and included as integral parts of program solutions.

A National Policy

An effective solid waste management program requires the status of a sustained national policy oriented towards a recognition of the need to improve solid waste management practices in the United States (see Chapter 10). Such a national policy must be strong enough to serve as a mechanism to assist state governments to respond more quickly to the needs of their local governments and their inhabitants. This policy would include broadly defined goals and would establish a national commitment to action; it would provide essential direction to all agencies of the federal government as well as to the States; it would recognize a partnership endeavor between the federal government and the States; and it would provide for the development of fundamental information on the environmental effects of solid waste in relation to other waste disposal practices in manners that would permit institutional solutions to these problems.

The main thrust of federal efforts should be oriented towards the development of state capabilities to improve solid waste management practices through the various programs and concepts outlined in this report. Federal assistance to the States should be oriented towards the development of effective state programs for the improvement of solid waste management practices. Suitable periods of time must be given to the States to permit them to evolve new programs that reflect effective solutions to the problems identified in this report. After suitable technical and financial assistance has been provided to the States, then the federal government can expect the States to have developed measures and the abilities to insure that adequate solid waste services are provided to inhabitants, and that these services consist of levels and qualities of services that afford protection to the public health and are not deleterious to local environments.

Assistance to States

An effective federal program would recognize the current limitations within many States and would include adequate financial and technical assistance mechanisms to permit the States to undertake expanded, innovative, and more effective efforts. Because local governments perform the necessary solid waste services, some financial assistance programs through the States should be oriented towards local government needs.

Assistance programs should also recognize interagency solid waste management related functions and include mechanisms to permit responsible state agencies to improve and expand their capabilities. As one example, the office of the Attorney General must be strengthened in order to permit it to more adequately perform the prosecution function related to complex environmental problems. In those States where the primary environmental prosecution agency is located within local governments, assistance to improve their capabilities will be necessary. Similarly, the judiciary branch of state government must be strengthened if environmental control regulations are to be enforced.

In technical areas, the federal government must recognize that solid waste management cannot be effective without careful consideration of air and water pollution potentials and other environmental considerations. Very little substantive information is yet available on groundwater pollution, especially from trace elements, actually being caused by the disposal of wastes on the land. Also, little information exists that easily provides legally acceptable (indisputable) information on the movement of water from disposal sites into local streams, and vice versa. An enforcement program aimed at groundwater pollution caused by leachates from solid waste disposal sites would tend to lack adequate legal definition and possibly would be subject to capricious administrative and legal decisions. Strong federally sponsored clarification of these problem areas oriented towards individual States' needs are essential.

The States require various forms of assistance from the federal government to develop adequate solutions to their environmental problems. Some of these relate directly to the need for developing means to improve interagency coordination. Others reflect long-developed state legislative enactments that tend to retard the solutions of solid waste management problems. In these areas, the federal government can effectively undertake various forms of incentive programs that both assist the States in the development of their programs and encourage them to undertake the necessary innovations required for workable solutions to this complex problem.

The Task Force considered the various forms of assistance that could be provided to States and local governments. It recognized the limitations of categorical grants as administered by the federal government during the 1960s. At the same time, the existing revenue sharing concept lacks some guiding directives, and this omission will tend to encourage States and local governments to use these funds on more appealing development efforts.

The Task Force concluded that while the need to improve solid waste services exists throughout much of the country, efforts to bring about realistic solutions to these problems will require continual federal government stimula-

tion and effort.

The federal government should provide various forms of funding assistance to States for the improvement of solid waste services independent of its current revenue sharing program concepts. However, the Task Force emphatically rejected the premise of a funding assistance associated with a facility construction grants concept. Federal funding assistance is needed to: improve the administrative and managerial capabilities within state and local governments; permit consideration and development of more efficient local area solid waste service systems; develop essential formal and on-the-job training programs to permit the development of personnel for managing and operating improved services; permit States to develop more adequate assistance programs for local governments; strengthen the regulatory functions of state governments; stimulate intergovernmental coordination efforts and related activities needed to establish more effective local solid waste service systems; finally, federal funding is necessary to support state loan, loan insurance, or other state mechanisms developed to assist local governments to initiate the implementation of more effective solid waste service systems.

Within this context of broadened forms of assistance, the federal government should develop an incentives program that will encourage States to respond more rapidly and more effectively to the needs of their citizens. Some of the possibilities that should be considered are incentives to:

1. Encourage States to modify and repeal laws that restrict local governments from legally developing more effective operational systems;

2. Encourage States to repeal or modify laws that restrict local governments from using more effective financing mechanisms;

3. Encourage States to develop programs that foster substantive political merger or otherwise foster cooperative arrangements among these governments for the provision of more effective services;

4. Encourage States and local governments to broaden their personnel policies to reflect the needs of managerial talent required to administer and direct improved solid waste services.

A Regulatory Role

The Task Force concluded that the States should be the primary enforcers of solid waste services in each State. However, the federal government should initiate minimum quality standards for the disposal of nonhazardous or slightly hazardous solid waste. These ***should not*** be engineering specifications, but they should be minimum performance requirements that would provide policy-level guidance to permit States to develop flexible engineering specifications according to the characteristics and needs within areas of each State.

The federal role with respect to nonhazardous and slightly hazardous wastes should be restricted to assistance to States to permit them to more adequately perform their regulatory functions. This assistance would include: guidance and guidelines in the development or strengthening of state programs; research in improved technology; incentives programs to stimulate improved state and local government actions; and direct financial assistance to the several state agencies or branches of state government responsible for various aspects of state solid waste management regulatory endeavors.

With respect to very hazardous wastes – solid, liquid, or semi-liquid – the Task Force recognized the need for a greater level of federal participation. The adequate neutralization and final disposal of very hazardous wastes often require complex technology and commensurate regulatory endeavors. The development of appropriate standards for the storage, transportation, neutralization, and disposal of these materials can be performed effectively by the federal government. These standards should include both design or specifications for facilities and equipment, as well as performance criteria that establish the quality of desired results.

In the case of very hazardous wastes, field-level enforcement of federal standards can be more effectively accomplished by the States. Therefore, the regulatory control of these materials would logically be a joint federal-state effort. However, the development of the enforcement capacity of state governments still will require federal financial and technical assistance on levels somewhat similar to that provided by the Atomic Energy Commission to the States for the development of radioactive materials regulation.

The States should be given a suitable opportunity to develop their capabilities. At the same time, the federal government should develop the capability to perform the complete regulatory function regarding very hazardous wastes for those cases where the States cannot or fail to adequately protect the public health and the environment. However, the direct federal role should be considered only after the States have been given an opportunity to undertake this responsibility and after essential financial and technical assistance has been provided to the States during a regulatory program development period.

Research and Technology Development

The complexity of problems surrounding the potential pollution of groundwater in the United States will require closely coordinated research efforts among federal government agencies. State-level research capabilities in this area are severely limited. At the same time, the unique characteristics of each State will require the eventual determination of groundwater pollution characteristics and potentials both regionally and locally.

Basic research findings developed by the federal government will have to be applied in each State. This implies the restructuring of existing water research programs from their present orientations to those of combined academic training and field investigation programs capable of developing information necessary for investigating local

environments and developing personnel for evaluating local problems. The results of these efforts must be coordinated with the development of political solutions needed to protect the public and prevent the deterioration of local environments.

Additional research capabilities related to solid waste problems are required within the Environmental Protection Agency. However, these research functions must be developed and maintained independently from the line or regulatory functions of the agency. Every effort must be made to permit and support research functions in manners that will be oriented towards needed changes in line functions resulting from research findings. Present practices in governmental agencies often seem to result in suppression of research findings that contradict current policies or those which may jeopardize agency positions. At other times, line agency directives may result in research that supports existing policies, and these may not be in the best interests of, or meet the needs of, the States and their local governments.

In response to this need, the Task Force concluded that the complex research requirements for developing solutions to solid waste management problems require a major coordinated effort within the Environmental Protection Agency. The research conducted within the EPA should be funded and directed independent of the regulatory function of the agency. In this manner, research findings will tend to be less biased and can be more effectively used to redirect the regulatory functions of the Agency.

At the same time, other federal agencies have research capabilities that could apply to the development of effective solutions of solid waste management problems. Therefore, pure and applied research with contributions from numerous agencies will be required to develop essential information for the solution of solid waste management problems. A part of this interagency effort should be oriented towards the increased uses of secondary materials obtained from solid waste.

The Task Force recognized that research conducted by the federal government would tend to be fundamental in nature and national in scope. While the application of this research would be a state function, both technical and financial federal assistance will be necessary to develop effective applied research capabilities within each State.

A NATIONAL RESEARCH AND TECHNOLOGY DEVELOPMENT PROGRAM CONCEPT

The long-range research and technology development needs for improving solid waste management practices must take several forms. The problem of solid waste management reflects the larger problem facing state and local governments. Neither has established the necessary management mechanisms needed for dealing effectively with various urban problems. The administrative machinery of government is geared to simpler requirements and to a change of pace different from that which is being experienced today.

Much technical-level information also is needed before we can be assured that techniques advocated can produce the desired results. Improvement in solid waste management technology needed includes:

1. Fundamental knowledge of the physical environment and the effects disposal of various types of material have upon it;

2. Flexible solid waste management standards due to the differences in the physical environment within the various physical regions within each State;

3. The determination of tolerances within these substate environments for selected types of contaminants;

4. Economic comparisons of the various alternatives posed for the solution of identified solid waste management problems;

5. The reorientation or redevelopment of our governmental machinery at the federal, state, and local levels to develop solutions to these problems; and

6. The training of both administrative and technical personnel for both government and private industry needed to carry out these solutions.

Few of these requirements are available today at any level of government; all must be improved before funds and materials can be effectively applied to solid waste management problems.

Our desire to bring about immediate solutions to long-developing problems often causes individuals and groups to reject the initiation of such long-range efforts. Yet, without a firm foundation constructed over a suitable period of time, the necessary public understanding of the problems and acceptable solutions will not be realized. Once the magnitude of the problems and the relations to other concerns of the States and local governments are recognized, solutions can be evolved. The massively funded social programs of the 1960s often fell far short of their goals; the ideas were commendable, but the long-range structure needed for substantive social change was missing.

New concepts can be applied only when they are generally accepted; but social attitudes and social views normally change generation by generation. Substantive changes can be brought about only by accelerating the social acceptance of new concepts of government. Therefore, we should expect to modernize our governmental structures at rates comparable to the rates of change occurring in general social attitudes. The programs of the 1960s served the function of stimulating changes in social attitudes, and in the 1970s we can begin the actual efforts to develop the governmental structures needed to permit us to reflect the current social needs and desires of the Nation's citizenry.

Building the capabilities for protecting the natural environment while providing necessary solid waste collection and disposal services as part of our overall urban service needs is a difficult undertaking for most local governments in the United States. These governments need various forms of support from the States and the federal government. A long-range program oriented towards these

purposes would have a magnitude similar to that initiated in the mid-19th century to build our national agricultural capabilities. However, where that program was oriented toward economic development for national enhancement, this new program must be oriented toward the development of necessary urban services in manners that permit us to retain desirable natural and cultural environments.

During the 19th century, federally funded land grant colleges were established in each State. These colleges perform research and train the manpower needed by both the government and private industry for the development of our agricultural potential. As part of this system, the Agricultural Extension Service was formulated with joint federal and state government funding. Personnel hold joint federal-university appointments; extension agents work directly with agricultural industries; and they carry results of pure and applied research as technology developed by the federal government and state educational institutions. Functioning in support of agricultural extension agents are: the land grant colleges; agricultural experiment stations which perform field-level research applicable to local environments; and the Federal Soil Conservation Service which evaluates soil conditions within local environments. Parallel with these elements are the capabilities of the U.S. Forest Service with comparable associations within land grant colleges and with field functions similar to those of the Agricultural Extension Service. These federal agencies and state institutions also provide information to state government agencies concerned with agricultural development and natural resources protection.

The above system illustrates the range of joint federal-state efforts needed to evolve workable solutions for providing urban services in environmentally safe manners through our existing political institutions. A local government assistance corps is needed to carry essential aid programs to local governments on a routine basis. The aid they would bring from a combined state-federal program would include administrative, managerial, financial and technical assistance in various problem areas – including solid waste management.

As environmental protection agencies evolve within the States, the effectiveness of their programs will depend upon their general acceptance by the inhabitants of the hundreds of local governments in each State. Both local governments and private industries need assistance in developing greater capabilities for providing improved waste handling or treatment, collection, processing, and disposal functions. These capabilities can be developed in manners that result in improved levels of services while, at the same time, protecting the public health and local environments. The States, too, need to develop more effective administrative machinery both for assisting in the development of essential services and in providing for their regulation.

The current urban services improvement-environmental protection problem is much more complex than our national effort to build the world's greatest agricultural production system. The development of an effective program for solid waste management, in conjunction with the improvement of other urban services with an environmental protection orientation, is as great a national concern today as the need for improved agricultural production capabilities was 100 years ago. The current problem requires the development of the means to modernize the delivery of necessary services by our local governments; this is a more formidable undertaking than was reflected in our national program to stimulate agricultural productivity.

The complexity becomes more apparent as we recognize that solutions to solid waste management problems require in-depth consideration of the need to expand resource recovery technology within our economic system. Consideration of secondary materials or energy recovery from solid waste can impact upon large segments of our national industrial complex. In some cases, environmental investigations may show that the recovery of deleterious materials from waste is beyond our capabilities or is too costly. Then, governmental policies would have to be applied to reduce the use of such materials in manufactured products. In other cases, recovered materials could compete effectively with virgin materials if preferential governmental policies benefiting virgin materials producers were removed and the two commodities were allowed to compete equally. In other cases, national policy may determine that preferential treatment should be given to the use of secondary materials.

Developing solutions to our current problems require joint federal-state participation in the construction of a regulatory, technical assistance, educational, and pure and applied research institutional complex greater than that evolved for the development of our national agricultural system. But similar to the evolution of our national agricultural program, the results of a current effort must be measured in decades; and if such a joint national-state commitment is made today, the full result may not be realized until the 21st century.

In response to this need, the Task Force concluded that the delivery of necessary urban services in a manner that is not deleterious to our environments through our existing institutional structures will require a national commitment to a coordinated long-range program. Such a national program would include a broad spectrum of federal efforts with joint participation from the States oriented toward the establishment of the necessary regulatory, technical assistance, educational, and pure and applied research institutional complex required to evolve needed solutions.

12. Resource Recovery

THE GENERAL CONCEPT

The recovery of resources from solid waste will gradually become one of the major contributions to the solution of solid waste management problems in numerous metropolitan areas. Many of the problem areas already identified in this report affect our society's abilities to convert solid waste into resources. Our sociopolitical system (the acceptance by the public of various forms of governmental functions such as taxes, land-use regulations, and other governmental regulations and enforcement powers) greatly affects our economic system and our ability to use greater quantities of secondary materials. Our inability to use these materials relegates them to the status of solid waste – useless materials without economic value.

From a technology standpoint, a proportion of the material presently discarded could be reused or recycled into useful materials, and thereby they could become resources (see "Solid Waste As a Resource," page 49). However, because the cost of their use is greater than the value that their use could provide within the framework of our economic system, they remain solid waste. By applying sociopolitical solutions to the economic status of many waste materials, some of the current economic disadvantages can be overcome and a greater demand for them could be stimulated. With increased demand, greater uses would occur, and the materials would no longer flow as part of our waste stream but would be used as secondary resources.

The application of sociopolitical efforts to bring about such a change in status for many materials is a slow process and the necessary change must be measured in decades and generations. Therefore, application of sociopolitical solutions to our solid waste problems must begin immediately if we are to expect substantial progress by the end of the 20th century.

The Task Force concluded that ultimate solutions to our solid waste management problems can evolve only through concerted efforts to reuse materials currently being discarded. The emphasis upon technology to reduce waste to smaller volumes and to construct more sophisticated disposal sites are only interim answers to the more fundamental problem. Our volume of consumed materials is increasing and is expected to continue to increase into the foreseeable future. The above answers can only result in continued cost increases for necessary solid waste services.

Increased resource recovery must occur within our economic system and solutions to resource recovery ultimately developed will be reflected in expanded uses of these materials by our Nation's industrial complex. Social attitudes of our population and government policies grossly affect industries' willingness and capabilities to recover and use more materials from solid waste. Expanded use of recovered materials will occur at a rate determined by social acceptance of commodities manufactured from these materials and with government efforts to stimulate their use.

Because resource recovery efforts are part of our economic system, the fundamental economic supply and demand concepts must be applied to solutions. Expansion of a commodity's supply beyond the volume that can be sold serves to drive the price of that commodity downward. Expansion of demand serves to increase the commodity's value when the supply is limited or fixed. When the value of a commodity is increased by stimulating demand or a reduction in supply, entrepreneurs will begin to search for ways to expand the supply of that commodity in direct relationship with the profits they can anticipate. By expanding the demand for secondary materials, entrepreneurs can be expected to reuse more materials from solid waste.

SECONDARY RESOURCE CONCEPTS

The concern for the recovery of resources from materials now flowing in the solid waste stream generally is concerned with three concepts. These include the recovery of energy from the organic fraction of the solid waste that presently is being incorporated within landfills, the recovery of secondary materials that could be recycled and used by various manufacturing industries, and the direct reuse of selected materials that are found in the solid waste mix.

Materials Reuse

Of the three recovery concepts based upon economic use of materials, the direct reuse of materials probably represents the smallest fraction of the total volume of solid waste found within urban areas. Reuse of materials has received much attention in recent years because of the high consumer visibility of throwaway cans and bottles recently adopted by much of the bottling industry.

The direct reuse of materials has declined in recent years primarily because of the high labor costs and the social status associated with the salvage industry. The stripping of usable parts from automobiles, appliances, and other discarded items often functions as a marginal type of economic activity. Small salvage businesses necessarily must pay low wages; current labor laws and the availability of welfare make it very difficult to obtain needed labor for

such activities. Some of these businesses operate on the fringes of legitimacy and accept used parts from any source available. Too often, this permits the traffic in stolen items to continue.

In considering the stimulation of greater reuse of materials, care must be taken to evaluate the relative benefits of various courses of action. For example, legislation banning discard bottles and cans will help reduce litter in public places and may reduce some national energy requirements. Forcing the use of returnable bottles will tend to reduce the use of aluminum cans. Recovery of aluminum from the waste stream can make the difference between a profitable and nonprofitable recovery endeavor based upon our current technology. Reduction of the aluminum fraction in the solid waste mix also could result in reduced profitability and decreased interest in secondary materials recovery from mixed community waste by private enterprises. While this legislation may satisfy some outspoken public interest groups, it could result in decreased efforts to recover many types of materials from mixed urban waste.

Energy Recovery

A large fraction of the solid waste generated within communities consists of paper and other organic substances that have energy value. Estimates indicate that the mixed organic fraction of normal community waste often has energy equivalents approximating one-half that of bituminous coal commonly used in fossil fuel power plants. By mixing this fraction of the solid waste with coal or fuel oil it is possible to reduce both the flow of solid waste to disposal sites and the quantity of other fuel needed by these power plants. This concept represents a form of energy recovery from solid waste and its adoption could substantially reduce solid waste disposal problems within some metropolitan areas.

The use of solid waste for this purpose would require conversion, at some cost, of already constructed power plants. The received solid waste would have to be separated, sized, and evaluated for heating value. Then the proper amount of coal or fuel oil would have to be added to obtain the required heating potential. Private power companies would have to determine whether this changeover process would provide any economic advantage over the continued use of existing energy sources. Public power companies might more easily accept a higher-cost operation where the savings accruing to the solid waste sector could be balanced against the possibility of increased capital and operational costs resulting from the use of solid waste as a supplemental fuel in their power plants. Some means would have to be developed to construct an accounting system that would permit such an evaluation.

These alternatives can be considered in those metropolitan areas where sufficient solid waste is generated near a power plant that can be used to assure a continued supply of the needed energy materials. Conversions of existing fossil fuel power plants in these metropolitan areas will occur if economic advantages are possible. Such advantages also will stimulate the consideration of solid waste as a supplemental fuel for power plants presently being planned for other metropolitan areas. However, where a power plant is lacking and is not needed or the volume of solid waste is lacking, the recovery of the energy fraction from solid waste will not occur.

The need for a new supplemental power plant in an area will be determined by the ability to sell power or obtain an acceptable economic return on the energy produced. The acceptable economic return is determined by a comparative evaluation of the costs of producing and using the energy. Such an evaluation will include the capital, operating and maintenance costs of the power plant and complementary facilities, and the costs of disposing of residues and other noncombustible wastes in an environmentally safe manner. These will be compared to other environmentally safe alternatives for processing and disposing of the same local solid waste. In the past, efforts have been made to compare only the cost of the processing plant against the cost of some form of land disposal of the solid waste. Very often, the costs of disposing of residues and noncombustibles and other elements of the required system have been ignored in feasibility evaluations.

In those metropolitan areas where the use of solid waste as a fuel is possible, the remaining residues also may have value. If the volume of solid waste is great enough, it may be economically feasible to construct materials separation plants that will permit the recovery of a variety of inorganic materials. Some of these materials would have been removed from the waste prior to use in the energy recovery process and part would remain as the process residue.

Secondary Materials

The recovery of secondary materials from solid waste and their subsequent recycling to manufacturing industries as raw materials represent an effective means of reducing the flow of materials into a solid waste stream. The various processes for recovering resources from solid waste are very similar to normal mining practices that separate and beneficiate ores to the quality required by manufacturing industries. In this case, these secondary materials represent man-made ores that must compete in our economic system with virgin ores used by these same industries.

For secondary raw materials to compete with virgin materials, the man-made ores must be available in sufficient quantities, be of the proper quality, and be supplied at competitive prices. It is the function of the secondary materials industries to meet these requirements in order to survive within our economic system. To accomplish this function, the secondary materials industries must be able to conduct the necessary research to determine the availability of secondary materials and be able to deliver these materials to the manufacturing industries at prices that will give the latter industries an economic advantage over present practices. This economic advantage and the acceptance of

secondary materials are reflected in the industry demand for selected types of these materials.

If the secondary materials are produced within the required framework and potential users of these materials still refuse to accept them, then demand for these materials still does not exist. The failure to accept secondary materials may be in response to many indirect factors that extend beyond the simple materials availability and price mechanisms. As one example, the potential user industry may be vertically integrated with corporate affiliations that require continued utilization of established supply procedures. This integrated structure may have taken many years to construct and it may not be in the best interest of the corporation to alter its developed function. As another possibility, the potential user may feel that the use of secondary materials could injure consumer reception of his product. In the first case, refusal to accept secondary raw materials stemmed from a long-standing corporate policy. The second case reflects industry's awareness of and concern for social acceptance of industrial products.

Public policies greatly affect the industry demand for selected secondary materials. In some cases, social preference for new or virgin materials has stimulated governmental actions in favor of these types of materials. In other cases, virgin materials industries have capitalized upon social attitudes to obtain preferential governmental treatment or policy actions in favor of their products. In past years, such actions by government were considered to be in the best interest of the Nation. These governmental policies served to stimulate exploration and raw materials utilization needed by our expanding economic activities. Now, some of these policies will have to be reevaluated in the light of the social costs associated with the continued preference for virgin materials as compared to the increasing costs of solid waste disposal and the deterioration of local environments.

SECONDARY MATERIALS INDUSTRY CONCERNS

Until recently, little thought has been given to the need to increase the reuse and recycling of secondary materials. As a result of long-established social, political, and economic attitudes, numerous policies and practices have developed that retard the expansion of secondary materials industries. Four major areas of concern have been recognized that can be altered by governmental action.

Tax Policies

The federal government has provided depletion allowances to industries engaged in natural resource exploration and exploitation. This tax incentive encourages the use of virgin materials in preference to the use of secondary materials. The secondary materials industries feel that this allowance does not permit them to compete with virgin materials, and it functions as a disincentive to the use of secondary materials. Two alternatives are possible. Either the depletion allowances should be removed from virgin materials, or secondary materials industries should receive compensatory incentives. Either of these two actions would allow the two sources of materials to compete fairly and equitably. Some virgin materials producers, specifically pulpwood producers, receive a preferential capital gains treatment. This works to the detriment of the secondary paper industries and reduces their capability of competing with pulpwood producers.

Freight Rates

A substantial difference in freight rates charged by rail carriers exists between virgin raw materials and recycled materials. The secondary materials industry believes that virgin materials have higher per unit of volume values than recycled materials. At the same time, these two sources of raw materials often compete in the production of similar products. Therefore, freight rates established by the Interstate Commerce Commission should be set in a manner that does not give an advantage to either type of material through set tariff charges. Similar problems exist for both rail carrier and ocean transport of secondary materials. In the latter case, the tariff differentials can affect the national balance of payments by forcing importation of virgin raw materials in preference to use of domestic secondary materials. Increased freight rates also prevent secondary materials producers from competing effectively with material producers in other nations on the international market.

A recent study conducted by Battelle Institute drew the following conclusions on the impact of railroad freight rates on the recycling of ferrous scrap.[27]

1. Present scrap markets are retarded because of transport rates which encourage the usage of iron ore.

2. Future scrap markets are being affected because new investment that would be logically directed to scrap-intensive steelmaking is diverted because of the existing freight-rate structure of ore-intensive steelmaking.

3. Iron ore (a limited domestic natural resource) is being exploited when it can and should be conserved.

4. Some scrap iron that should be recycled is unable to move; thus the environment is despoiled by unnecessary accumulations of solid metallic waste.

Continuation of long-established freight-rate tariff-setting practices which result in biases against the transportation of secondary materials will also continue to retard the demand for these commodities. As long as such practices continue, our use of virgin raw materials will increase and the volume of solid waste generated also will continue to increase.

In response to these needs, the Task Force concluded that, as a means for stimulating the demand for secondary materials, the Congress of the United States must establish routine review functions to evaluate policies affecting the use of recovered resources. Immediate evaluations to be considered are:

1. The equalization of capital gains tax benefits to permit secondary materials to become competitive with virgin materials;

2. Equalization of Interstate Commerce Commission

freight-rate tariffs to remove government-established differentials that may benefit either virgin or secondary materials.

Government Procurement Policies

Government procurement policies also often give preferences to virgin materials over goods manufactured from secondary raw materials. Considering that the federal government is one of the largest consumers of goods in the United States, current policies substantially reduce manufacturing industries demands for secondary raw materials. Purchasing practices vary among various federal government agencies. For example, the Government Services Administration uses very few recapped tires and very little used motor oil, but the Department of Defense routinely uses both of these items.[28]

Within the States, statutes and purchasing specifications often dictate that only new or virgin materials will be accepted. When purchasing agents for government have no acceptable way to judge the relative quality of a new item as compared with a renovated item, they have little choice but to accept the new commodity and specify the use of virgin materials as a required standard. The problem then becomes one of objectively evaluating the suitability between new and used or renovated commodities or those manufactured from secondary raw materials.

Until recently, federal government agencies refused to release materials and commodity information developed for their purchasing comparison purposes. Few state governments can afford to perform the comparative evaluations on hundreds of routinely purchased items. In addition, many industries would protest violently if deficiencies in their products were documented or implied by acceptability specifications and this information were to be published by a government agency. Such information could drive some products off the market and could foster litigation against the government by the offended industry. Yet, such information would be necessary before state and local government purchasing departments could be relatively assured that the renovated item compared favorably in performance with a new item. However, where the comparison can be made, state and local government purchasing departments can help reduce the flow of solid waste by establishing performance rather than strict specification standards that unduly discriminate against the secondary materials within commodities or with renovated commodities.

It was a conclusion of the Task Force that governmental purchasing agencies should establish acceptability criteria on the basis of commodity performance rather than according to specifications oriented towards either virgin or secondary materials; and that a means should be developed to permit the routine release of information developed by federal agencies to state and local government purchasing agencies. The Task Force noted that States should direct their purchasing agencies to evaluate materials and equipment on the basis of performance standards wherever possible. Purchasing regulations should not preclude the use of secondary materials; selection of commodities should be based solely upon performance capabilities and comparative costs.

Zoning and Licensing

Many salvage dealers and secondary materials industries in local areas still suffer from restrictive zoning practices which either force such enterprises into remote areas or prevent their expansion to meet growing industry requirements. Again, part of this problem is related to the stigma attached to industries that are engaged in the recovery of materials from solid waste. Some local governments do not permit the location of such industries within their jurisdiction by means of restrictive zoning practices. Others prevent the relocation of these industries near major transportation routes necessary for their continued operations. Very often, local public opinion prevents the relocation of such operations in areas zoned for this purpose. These practices reduce the ability of secondary materials industries to profitably operate. Expansion of such industries will be necessary if urban solid waste problems are to be reduced.

In many areas, restrictive licensing practices are followed for businesses engaged in materials salvaging or secondary materials recycling. Again, part of the problem stems from social stigma, but part of the difficulty originates within the industries. Some salvage operators function at the fringe of the law and cater to local elements that operate outside the law. Some maintain their facilities in a manner that prompts public protest. Such establishments require stricter law enforcement practices and magnify the problems of local law enforcement agencies. The management of these types of businesses is changing rapidly, but it will require many years for local attitudes to change.

To meet these needs, the Task Force concluded that energy and secondary resource recovery should be encouraged by state governments, and local governments should be encouraged to give secondary industries equitable consideration with respect to other forms of industries. Because of the need for stimulating greater recovery operations within local areas as one means of reducing current solid waste management problems, the States also should encourage local governments to remove restrictive zoning practices that preclude the development of needed recovery facilities. States should consider the establishment of review and other program policies to assist these industries in their efforts to obtain necessary facility sites.

NON-ECONOMIC RECOVERY

Some commodities produced by industries contain materials that should not be indiscriminately released into the natural environment. The Environmental Protection Agency has begun to classify these materials. Further efforts will be needed to determine the means for alleviating hazards associated with both the handling and disposal

of such materials.

In some cases, the volumes of selected materials that are entering local environments through the solid waste stream will have to be reduced. This will force the recovery of such materials from the waste stream prior to disposal. An alternative to this action would be governmental restrictions upon the use of these materials by industries.

The recovery of very hazardous materials from solid waste probably will entail costs greater than the market value of the recovered material. Where such materials are essential to the manufacture of some type of product, difficult governmental decisions will have to be made that will permit these recovered materials to be recycled back into the economic system.

The Movement of Goods

The effective solution to solid waste management problems utilizing maximum energy and resource recovery methods will require the transportation of materials between various political jurisdictions. Some States have encouraged local governments to set up barriers to the transportation of solid waste into their jurisdictions. Solid waste moved by common carrier is no different, in an economic sense, than any good or commodity moved by such carriers. The value of solid waste, in effect, becomes that value paid by some party for its movement.

Aside from the economic implications to the movement of goods, many local governments will not be able to solve their solid waste management problems without being able to ship or receive solid waste. While the reasons behind the desire to prevent materials from being disposed of in some jurisdictions is recognized by the Task Force, this type of action can only work to retard the fundamental solutions to our national solid waste management problems.

Therefore, the Task Force concluded that Congress should undertake immediate legislation to permit the free exchange of solid waste between two or more parties regardless of the jurisdiction through which it moves or into which it moves. Within States it will be necessary for each State Legislature to enact similar laws. Until these actions are taken, larger and larger quantities of materials will enter the solid waste stream instead of being recovered or reused.

Some Solid Waste Terms and Concepts

SOLID WASTE

The Task Force concluded that the States should be concerned with all forms of solid waste and chose to accept the definition of solid waste as: useless, unwanted, or discarded material with insufficient liquid content to be free flowing. In an economic sense, such materials are worthless.

SOLID WASTE CHARACTERISTICS

Abandoned and Scrapped Vehicles

Composition: Discarded automobiles, trucks, buses and other vehicles.

General sources: Residences, various industrial establishments, roadways, open areas.

Agriculture

Composition: Field, truck, and tree crop residues; animal manures and bedding; animal carcasses; pesticide, herbicide, fungicide, etc., residues and containers; discarded equipment.

General sources: Agricultural, educational services, and government industries establishments.

Ashes and Residues

Composition: Residue from residence and industry heating and cooking fires; incinerators and open waste burners; power plants.

General sources: Heating and cooking units in residences and various industry establishments; sanitary service and government industry incinerators; and power plants in various industry establishments.

Construction

Composition: All discarded construction materials.

General sources: Residences and other new construction by contract construction and government industry establishments.

Dead Animals, Fowl, and Fish

Composition: Both large and small animals, fowl, fish not related to agricultural industry activities.

General sources: Residences, agricultural industry establishments, streets and highways, open areas, water bodies.

Demolition

Composition: All construction materials discarded from razed buildings, other structures, and public works projects.

General sources: Urban renewal; structures renovation; street, sidewalk, etc., improvements by contract construction and government industry establishments.

Garbage

Composition: Animal and vegetable wastes from storage, handling, preparation, and sale of food.

General sources: Residences; food preparation, serving and sales in various industrial establishments.

Manufacturing

Composition: Discarded materials remaining from mechanical or chemical processing, discarded equipment.

General sources: All manufacturing industry establishments.

Mining

Composition: Overburden, submarginal grade ore, mill tailings, washing plant rejects, slag, processing plant wastes, discarded equipment.

General sources: All mining industry establishments.

Street Refuse

Composition: Sweepings, roadside litter, dirt, leaves, tree branches, catch basin debris, contents of litter receptacles.

General sources: All roadway waste.

Rubbish

Composition: Combustibles such as cloth, paper, and plastics; boxes, plastic containers, packaging materials; wood, tree branches, yard trimmings; wood furniture, bedding, other wood fiber or plastic household goods; non-combustibles such as metal objects, glass, crockery, minerals, dirt, etc.

General sources: Residences and all industrial establishments.

Sewage Treatment Residue

Composition: Solids from sewage treatment plant coarse screens, grit chambers, and lagoons; septic tank sludge.

General sources: Residences, various industrial establishments, but primarily government and sanitary service establishments.

Special Wastes

Composition: Hazardous solids and sludges, anatomical and pathological wastes, explosives, radioactive materials.

General sources: Residences; manufacturing, service,

and government industry establishments.

Water Treatment Residues

Composition: Solids from coarse screens and grit chambers, sludge.

General sources: Water supply and government service industries.

Note: Solid waste sources are classified primarily according to the Standard Industrial Classification System. See U.S. Office of Statistical Standards, *Standard Industrial Classification Manual*, Executive Office of the President/Bureau of the Budget, 1967, and Charles Vigh, *Solid Waste Collection System Requirements*, for Division of Solid Waste Disposal, Kentucky State Department of Health, October 1971.

FEDERAL DEFINITIONS OF SOLID WASTE

From: U.S. Environmental Protection Agency, "Solid Waste Management Glossary," Publication (SW 108ts) 1972.

SOLID WASTE – Useless, unwanted, or discarded material with insufficient liquid content to be free flowing. See also WASTE.

Agricultural: The solid waste that results from the rearing and slaughtering of animals and the processing of animal products and orchard and field crops.

Commercial: Solid waste generated by stores, offices and other activities that do not actually turn out a product.

Industrial: Solid waste that results from industrial processes and manufacturing.

Institutional: Solid wastes originating from educational, health care, and research facilities.

Municipal: Normally, residential and commercial solid waste generated within a community.

Pesticide: The residue resulting from the manufacturing, handling, or use of chemical for killing plant and animal pests.

Residential: All solid waste that normally originates in a residential environment. Sometimes called domestic solid waste.

WASTE

Bulky Waste: Items whose large size precludes or complicates their handling by normal collection, processing or disposal methods.

Construction and Demolition Waste: Building materials and rubble resulting from construction, remodeling, repair, and demolition operations.

Hazardous Waste: Those wastes that require special handling to avoid illness or injury to persons or damage to property.

Wood Pulp Waste: Wood or paper fiber residue resulting from a manufacturing process.

Special Waste: Those wastes that require extraordinary management.

Yard Waste: Plant clippings, prunings, and other discarded material from yards and gardens. Also known as yard rubbish.

The following information was obtained from a presentation by John Hill, Director, Program Development and Management Staff, Office of Solid Waste Management Programs, Environmental Protection Agency, at a Washington, D.C., meeting on November 7, 1972.

The normal residential-type waste typically picked up by community collectors is now recognized by EPA as a small part of the solid waste problem. The major problem consists of industrial wastes, including chemical industry sludges. Agricultural waste and mining waste includes the bulk of waste, by volume.

The EPA now has developed a general classification system which includes materials likely to occur in any waste stream (generation, collection, and disposal system). The EPA study under way has evaluated the character of 5,000 forms of solid waste according to three general types. Type 1 waste is considered to be extremely hazardous. Wastes of this type include explosive, flammable, corrosive, and toxic materials that, if not properly handled, will most likely cause an immediate impact on human health or other living organisms. Plutonium and parathion were used as examples. Noted also was the unique character and uses of many of these wastes and the probable need for federal control over their handling.

Type 2 wastes were characterized as moderately hazardous. Within this group EPA has identified about 4,500 materials. These apparently include the 50 Type 1 wastes when they appear in very small quantities.

Type 3 wastes are considered to be non-hazardous and include the range of materials commonly discarded from residences, offices, etc. These are the materials that predominately appear in community waste collection and disposal systems.

The EPA considers that three types of waste can cause adverse health, environmental, aesthetic, and related impacts associated with the way the Nation handles their storage, collection and disposal, but primarily disposal.

Solid waste disposed of by a residence may not be hazardous in and of itself, but if not properly disposed of can create hazards – leachate that infiltrates groundwater sources, methane gas, obnoxious odors, etc.

DEFINITIONS OF SOLID WASTE BY STATE LEGISLATURES

The tendency is to consider the term to include all solid waste materials. State agencies tend to have differing functions regarding segments of generic concept of solid waste due to legislative authorization. A state agency designated as "the Solid Waste Management Agency" may have the authority to establish guidelines, inspect, cite offenders, hold administrative hearings in limited areas (segments) within what may be generically considered solid waste.

State Legislatures over the years typically gave the above functions to various agencies concerned with very specific problems or types of solid waste. The determination of the extent of authority that the designated Solid

Waste Management Agency actually possesses can only be determined by examination of that State's laws to determine where other specific authorities have been rendered by a State Legislature.

A state law designating the single State Solid Waste Management Agency may give to that agency all authority regarding solid waste management within that State. At the same time, the law must specifically rescind all other state legislation giving authority or functions to other state agencies (this usually requires the specification of chapters and sections of specific laws). If the general law does not specify that and the designated general Solid Waste Management Agency has some type of coordination or supervisory jurisdiction while other agencies may perform functions regarding some segment of the generic term "solid waste," then the other agencies can simply ignore the designated Solid Waste Management Agency. Without the above forms of clarification within a state solid waste act, the Legislature, in effect, has defined the term "solid waste" narrowly and has exempted some forms of state agency solid waste management functions, as defined generically, from the authority of the State Solid Waste Management Agency. This could have been done by either direct intent or oversight.

There is no simple way to determine the extent of authority given to a State Solid Waste Management Agency and, therefore, to the meaning of the terms solid waste or solid waste management designated by the actions of a State Legislature. A manager of a State Solid Waste Management Agency, unless he has designated the task to someone familiar with his State's laws, simply has no way to extract the legislatively designated meaning of the term. To do so in any State will require a careful examination of that State's laws.

The process begins first by understanding the broad definition of solid waste. Then, all possible activities of state-level agencies performing some part of a management function must be determined. Finally, all possible agencies which a State Legislature logically may have given some responsibility regarding both segments of the broad (generic) term and segments of a management function must be evaluated by examination of that State's laws.

In all probability, a State Legislature may have directly or indirectly given some form of authority to a state agency, but that agency may not have complied with the Legislature's intent by not developing administrative regulations covering the situation. As another possibility, the administrative regulations may have been properly prepared but the function is not carried out in practice because of inadequate manpower or budget or both. In this case, the function may be administratively dealt with through periodic reports but, in effect, no actual agency action.

SOLID WASTE MANAGEMENT

The term "solid waste management" has been used differently by different individuals and groups in recent years. Again, the Task Force indicated its desire to maintain the broadest possible perspective regarding this term. Management, meaning control, is exercised differently by individuals concerned with solid waste service system operations than by agencies of government concerned with pollution control.

Generally, local governments (state subdivisions and municipal corporations) have had the problem of providing better services and regulating the actions of these services. The regulation has generally appeared as zoning decisions with respect to the location of facilities and disposal sites.

States sometimes also require subdivision and municipal corporation enforcement agencies to enforce state laws. Theoretically then, local law enforcement agencies often can regulate the actions of their own political jurisictions to assure that they are in compliance with state laws and regulations. As a practical matter, such action is usually taken by a local law enforcement agency only upon the insistence of the state agency filing a complaint.

The above describes a regulatory form of management. On a state level, agencies concerned with solid waste management practices typically develop standards (guidelines), issue various types of permits to service system operators (public and private), and investigate operations to assure compliance. These citations may be issued directly (in this case, the agency also functions as a law enforcement agency) or it may use other law enforcement agencies for the purpose of serving the offending operator with a notice of non-compliance.

SOLID WASTE MANAGEMENT PLANNING

Just as solid waste management has different meanings depending upon the purpose of the concerned organization or agency, planning for improved agency or organization functions also has various meanings. The program planning needed to develop the most effective regulatory agency in state government is very different from a program plan required by solid waste service areas, and the functional planning required by an operational organization or agency. The purposes of these different levels of planning are different, their administrative requirements are different, and the talent of personnel needed also differs.

The differences in meaning of the term "solid waste management planning" are only now becoming apparent. As the role of the States relating to solid waste management is evaluated by the Task Force, the differing concepts of a state agency's program planning requirements will have to be considered.

The following excerpts from *An Industrial Solid Waste Management Program for Kentucky* illustrate some basic solid waste management planning requirements for state agencies.

> Various types and levels of planning activities will be required to develop an effective . . . Solid Waste Management Program. Planning is essential to any form of effective management.
>
> Planning essentially is the development of

step-by-step procedures required to implement some project or program. Each planning step describes:

- The desired objectives of the project or program
- The actions to be taken by the participating agencies
- The timing of phasing of each section
- The results expected.

As part of the plan development process, the following must be considered:

- The available resources in funds and manpower for the project or program
- The changes that would be required in existing activities to accommodate the new effort
- The value of diverting existing resources to the new effort.

It is not enough to state in a plan that something should be done. The plan must include procedures that describe how the project or program can or will be accomplished. The planning process requires a systematic organization and development of the proposed project or program. In a complex program each step must be similarly evaluated, organized, and developed.

Effective planning is a tedious process that requires broadly trained individuals. These individuals can have many different types of training but practical program planning generally is not taught in educational institutions. Experience is the only valid means of evaluations for such individuals. Generally, effective management planners come from industry with background incorporate planning, and from those forms of public activities where experience has been gained in complex program development.

SOLID WASTE AS A RESOURCE

The term "resource" seems to have been used with respect to the problems of solid waste management from two different viewpoints. In some cases, the term has been used in a social sense. The social view of solid waste as a resource tends to consider that discarded materials have value to someone somewhere and should not be indiscriminately destroyed. This view associates solid waste in a manner similar to other material elements within our environment. Solid waste is a resource in a manner comparable to the consideration of land, water, humans, and other forms of animals as resources. In this view, all of these should be used judiciously and in the best interest of all other factors.

Basically, this is an ecological concept which interrelates all the elements within our environment. In this view, all things should be used in the best interest of the total population or aggregate of other elements.

In the social concept of resources, no one device exists by which the utility or disutility of the resource can be measured. In this view, economics as a measuring device of acceptability is discounted. Because no single tool, concept, device, or measure exists, it becomes extremely difficult within a society to determine the general level of acceptability for suitably utilizing such resources.

Each time some material is considered a resource, the following sequence of questions necessarily must be asked and the answers found. This material is a resource for whom and for what purpose or in what way? Will it be utilized by technological means or set of means (is it to be picked up, hauled somewhere, deposited, processed, and redistributed)? If we do not accept economic parameters for measuring the utility of the material, what parameters are to be used; and will these parameters be acceptable to the individuals who must apply the needed technology and perform the labor associated with the material's reuse if it is to be moved or changed?

Solid waste also can be considered a resource in an economic sense. However, it becomes a resource when it has some economic value. In the context of economics, resources do not exist until they can be utilized within the framework of our economic system.

A pile of sand is not a resource, it is only a pile of sand, a deposit of stuff, until someone determines that he can use it for some purpose. He can use it only if he can afford to purchase or lease the mineral rights of the land upon which or in which the pile of sand is found. He then must be able to haul it somewhere at some cost to himself. He may use it to make cement for his home, or he may manufacture something with it, such as glass. In the latter case, he must spend more dollars to construct a glass processing plant. Finally, he must be able to do all of these things at a low enough cost so that people will buy his glass even though other individuals are also producing similar products.

If he could not afford to do all of this, the pile of sand is worthless to him; it is also worthless to everyone else who cannot use it in some way. The use of this pile of sand requires the expenditure of dollars or labor. In the economic context of a resource, the dollars, the cost in terms of labor, or both, are the measuring devices used to determine a value for the pile of sand. In this sense, the pile of sand can become a resource when someone finds a way to use it; until then it is worthless in an economic sense.

If a material is a resource in a social sense, it is valuable because it exists at some place. The material, whatever it is, does not have to have an economic value; it is a resource of and in its own right. Conservationists have long applied this concept to our land and water and, more recently, to our air. These things have social value because they are there, wherever that may be, and as such they are resources. If solid waste is a resource in the social sense, it too must have value for some of these same reasons, but not reasons based upon economic utility.

There simply isn't a reasonable mechanism in our social and economic system that permits us to jump back and forth between these two concepts. One cannot legitimately consider solid waste as a social resource and then attempt to apply economic measures for a part of its evaluation and vice versa. To do so is confusing to other members of society and reduces the general acceptability of the concept. Acceptance of the concept then is dependent upon group persuasion and willpower, with a correspondent negation of the group's established law and logic.

The view of solid waste as a resource out of place apparently reflects an economic application of the resource concept. In this view, the solid waste is considered to have some value that would permit it to be reused or recycled in some way. This view apparently holds that the material is considered as a waste because adequate efforts have not been made to illustrate its value.

When considering solid waste as a resource out of place, the problem becomes one of determining the intrinsic value of the material, and then, comparing this value with the costs of reusing it or converting it to a secondary material that can be used in some manufacturing process.

This is a difficult endeavor because an incentive to find a use or uses for the material is lacking, and because it is lacking, it is considered useless – a solid waste. Somehow an incentive to investigate this material must be undertaken, and the development of this incentive requires an expenditure of effort at a cost.

This effort and cost is similar to the normal developmental research undertaken by a firm as it searches for new areas of profitable activities through the creation of new products. In the case of solid waste, however, spontaneous initiative to undertake this development effort is lacking. The problem then becomes one of finding means of stimulating initiative to begin the investigative process. This is a different problem from the normal and simpler product development investigation usually undertaken by an industry.

Much of the solid waste generated in the United States has already been evaluated by industries to determine, within their existing business constraints, whether that material is of value to them as scrap, or a secondary raw material, or is solid waste and has no value. Much of the material now considered solid waste could be recycled or reused if the regional economy – the area where the material happens to be found – were not already using all of that material that could be profitably used in that area. Then the material, regardless of its composition, is solid waste and useless for a variety of reasons. It may occur in quantities too small to consider recoverable; it may occur in a form too difficult to process; it may occur spasmodically and thus would not permit the economic justification of a nearby processing plant; it may be mixed with other materials that make it technologically difficult or too costly to separate; and social and political biases may have been placed against its use.

If this material cannot be used within the region of its origin, perhaps it can be shipped to an area where it can be reused. Then, in addition to the above economic evaluations that must be made, the cost of shipping the material as a raw material to the processing plant must be included in the economic evaluation.

In the case of solid waste considered as a resource out of place, all of the above economic evaluations must be made at some cost, and to these costs must be added the cost of stimulating the initiative needed to begin the materials evaluation process. This places an additional cost burden on a material that has already been discarded as non-economic by the public or industry.

The question of who will bear this initiative stimulating cost now must be raised. Who will make it worthwhile to someone to begin the product development evaluation? The answer that seems to be emerging is that this cost should be considered a social cost, a cost that government should bear.

ECOLOGY

(As defined by the Office of Solid Waste Management): The science that deals with the interrelationships of organisms and their living and nonliving surroundings.

(Webster): (1) a branch of science concerned with the interrelationships of organisms and their environments; (2) the totality or pattern of relations between organisms and their environment.

Note: Substitute the term "human" for the term "organism" as one way to define human ecology.

ENVIRONMENT

(As defined by the Office of Solid Waste Management): The conditions, circumstances, and influences surrounding and affecting the development of an organism or group of organisms.

(Webster): (1) surroundings; (2) the complex of climatic, edaphic, and biotic factors that act upon an organism or an ecological community and ultimately determine its form and survival; (3) the aggregate of social and cultural conditions that influence the life of an individual or community.

Note: In relation to solid waste disposal problems, it appears that all three of Webster's definitions are applicable.

POLLUTION

(From the Solid Waste Management Glossary): The condition caused by the presence in the environment of substances of such character and in such quantities that the quality of the environment is impaired (made worse) or rendered offensive (nauseous, obnoxious) to life.

(Webster): (1) to pollute – to make physically impure or unclean (see Contaminate).

(Webster): Contaminate – to make unfit for use by introduction of unwholesome or undesirable elements.

Note: None of the above definitions are compromising in the sense that a little bit of a contaminant is non-polluting. Much of the controversy over pollutants has been concerned with the efforts to determine acceptable release rates of contaminants into the natural environment. To date, while some levels of agreement have been reached on what may be offensive, little is really known about what materials and what release rate of materials actually impairs the environment (see Webster's definition of Environment).

SOLID WASTE CAUSED POLLUTION

Pollution caused by solid waste has been interpreted in a number of ways. In some cases, a concept of visual pollution is considered a major part of the solid waste problem. Simply viewing garbage and junk is highly offensive to many people and, therefore, these would be visual pollutants. Bare earth, especially when it is known solid waste is beneath, is often considered as visually offensive. Ash piles, residue from incinerators, chemical plant and ore reduction plant slags are all less offensive, but these also are visual pollutants to some people. To natural ecologists and conservation groups, any material out of harmony with a "natural environment" may be a visual pollutant.

Visual pollution is a highly subjective concept. As such, reactions and decisions regarding it tend to be determined by the level of emotional stimulation provided to a particular situation.

The term "land pollution" is sometimes used with relation to solid waste. Very often, this term is associated with visual pollution and with aspects of biological or elemental environmental contamination.

Biological pollution, while the term is seldom used, has been the area of primary concern by governmental agencies concerned with solid waste management. Generally, these agencies have recognized possible pathogenic materials in solid waste delivered to a disposal site. Unless the sites were carefully maintained (a sanitary landfill) it becomes possible for vectors (transporting agents) to carry the disease agents from the site.

These vectors may be any form of animal life that visits the site and either picks up or becomes infested with the disease agent. Vectors can be insects, humans, birds, or other animal life. The most commonly considered are rats, but domestic pets are more likely to carry disease agents from a site and subsequently infect nearby populations.

Disease carriers also may be wind or water. Disease agents such as fungi spores typically are blown by wind from place to place. Bacteria and viruses typically have been associated with water as a carrier. The survival character of these biological agents is greatly affected by the temperature of the transporting water and other mineral constituents within the water.

If the water moving from a disposal site carries impurities picked up in either solution or suspension from the site, this liquid is now called leachate. The chemical characteristics of this leachate, in part, determine the survival capabilities of biological agents also picked up at the site.

Until very recently, Solid Waste Management Agencies gave primary emphasis to the biological pollution problems. The concern also was heavily oriented towards the biological disease agents carried by biological vectors. As a result, a heavy emphasis was given to solid waste management practices needed to control disease agents carried by rats, flys, mosquitos, and other insects. Birds and higher forms of animal life that could function as vectors were also given consideration.

Solid Waste Management Agencies now are giving greater emphasis to the dangers of natural elements and man-made compounds transported from a site by natural carriers. This might be called elemental pollution, but a common term has not yet developed. Elemental pollution occurs when solid waste materials, both organic and inorganic, gradually break down into simpler compounds or basic elements. Some of these may be transported from a disposal site by means of wind. Most probably are moved from a site via water. Water that filters through waste materials of any kind gradually picks up compounds or elements either in suspension or solution. Where the enriched water (leachate) filters down through soil, most of the materials in suspension will be blocked by soil particles and will be gradually filtered out (this is the same as the concept of a sand filter used to clarify water).

Some materials in either suspension or solution will chemically react with materials in the soil and either be fixed out (attached to the soil material) or will change the chemical character of the solution (leachate). The now familiar breakdown of organic materials, with carbon dioxide as a byproduct which mixes with water to form carbonic acid, is an example. Carbonic acid in groundwater gradually reacts with calcium in soil or rock causing the groundwater to become alkaline (hard water). This is a form of pollution or contamination, but it is a fundamental and all pervasive phenomena that occurs as a natural part of the normal geophysical processes. It is difficult to measure increased impairment (increased hardness of water) and relate it to man's solid waste disposal processes. It occurs, but in a vein similar to the contamination of the air caused by man's breathing.

POLLUTION CONTROL

(Webster): Control – (1) to check, test, or verify by evidence or experiments; (2a) to exercise restraining or directing influence over; regulate; (2b) to have power over.

TECHNICAL ASSISTANCE

The term "technical assistance" is normally left undefined in solid waste management legislation. In recent years, the federal government and State Solid Waste Management Agencies have used the term to mean assistance related to the technique or technology of solid waste collection and disposal. Assistance to improve methods for performing these functions is badly needed. In this context, technical assistance can only flow from organizations and agencies with these abilities.

Many State Solid Waste Management Agencies have the regulation of solid waste management practices as their primary functions. Their primary concern necessarily must be with the public health and environmental impairment resulting from solid waste collection and disposal practices. The primary concern of solid waste collection and disposal organizations and agencies is the development of the most

effective ways to collect and dispose of solid waste. Public health and environmental concerns necessarily must be secondary considerations.

This difference raises the following questions:

1. If federal government and state agencies are primarily concerned with the regulation of solid waste collection and disposal practices (service systems) either they:

a. are well-trained in both public health-environmental protection capabilities and operational systems management, or

b. they are well-trained in public health-environmental protection areas and are not as well-trained in operational systems management, or

c. they are well-trained in operational systems management and not as well-trained in public health-environmental protection capabilities, or

d. they are not well-trained in either area of concern.

Footnotes

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2. "Solid Waste Management Planning" is a confusing term used in various ways in recent years. Each level of government must plan for its role related to the solid waste management problem (see "Some Solid Waste Terms and Concepts," page 46, and Chapter 10, "Alternative Delivery Systems").

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14. J. M. McFarland, et al., *Comprehensive Studies of Solid Waste Management*, SERL Report No. 72-3, Sanitary Engineering Research Laboratory, College of Engineering and School of Public Health (Berkeley: University of California, May 1972), p. 104.

15. U.S. Department of Commerce, *Bureau of the Census: Statistical Abstract of the United States* (Washington, D.C., 1971), p. 17.

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17. The Task Force was primarily concerned with regulation from a public health and environmental protection standpoint. While the topic of rate regulations was discussed, the Task Force concluded that the complexity of the topic and the time limitations of the Task Force's efforts precluded satisfactory evaluation of this concern.

18. Fred Bosselman and David Callies, *The Quiet Revolution in Land Use Control*, prepared for the Council on Environmental Quality (Washington, D.C.: Executive Office of the President, December 15, 1971), p. 316.

19. From a speech presented by Thomas E. Carrol, Environmental Protection Agency, reported in Michigan Department of Commerce, *State and Regional Environmental Utilities: A Symposium on Waste Treatment Management and the Role of the States* (Ann Arbor: University of Michigan, April 26-27, 1972), p. 36.

20. Charles Vigh and Timothy Kuryla, *General Planning for Solid Waste Services* (Frankfort, Ky.: Kentucky State Department of Health, January 1972), p. 58.

21. "Statement by M. J. Mighdoll, Executive Vice President, National Association of Secondary Materials Industries, Inc., before the Subcommittee on Transportation and Aeronautics of the House Committee Interstate and Foreign Commerce Surface Transportation Legislation" (Washington, D.C., May 9, 1972), pp. 2 and 3.

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24. Totally extracted from: Elizabeth H. Haskell, *Managing the Environment: Nine States Look for New Answers*, Woodrow Wilson International Center for Scholars (Washington, D.C.: Smithsonian Institution, 1971), pp. 36 and 37.

25. Totally extracted from: Ibid., pp. 38-40.

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